EonStor U16U-G4010

320MB/sec SCSI-to-SCSI RAID Subsystem

Installation and Hardware Reference Manual

Revision: 1.1

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Warnings and Certifications

FCC (applies in the U.S. and Canada)

This device complies with Part 15 of FCC Rules. Operation of this device is subject to the following two conditions: 1) this device may not cause harmful interference, and 2) this device must accept any interference received, including interference that may cause undesired operation.

Warning:

Use only shielded cables to connect I/O devices to this equipment.

You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

CE This device is in conformity with the EMC

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Safety Precautions

Precautions and instructions

- Prior to powering on the subsystem, ensure that the correct power range is being used.
- The EonStor U16U subsystem comes with 16 drive bays (slots). Leaving any of these slots empty will greatly affect the efficiency of the airflow within the enclosure, and will consequently lead to the system overheating, which can cause irreparable damage.
- If a module fails, leave it in place until you have a replacement unit and you are ready to replace it.
- Airflow Consideration: The subsystem requires an airflow clearance especially at the front and at the rear.
- To handle subsystem modules, use the retention screws, eject levers, and the metal frames/face plates. Avoid touching PCB boards or connector pins.
- To comply with safety, emission, or thermal requirements, none of the covers or replaceable modules should be removed. Make sure that during operation, all enclosure modules and covers are securely in place.
- Be sure that the rack cabinet into which the subsystem chassis is to be installed provides sufficient ventilation channels and airflow circulation around the subsystem.
- Provide a soft, clean surface to place your subsystem on before working on it. Servicing on a rough surface may damage the exterior of the chassis.
- If it is necessary to transport the subsystem, repackage all drives and replaceable modules separately.

ESD Precautions

Observe all conventional anti-ESD methods while handling system modules. The use of grounded wrist-strap and an anti-static work pad are recommended. Avoid dust or debris in your work area.

About This Manual

Chapter Descriptions

This Hardware and User's Installation Guide for the EonStor U16U RAID subsystem is divided into 5 chapters and 5 appendices.

- ***Chapter 1: EonStor U16U Introduction***

  This chapter introduces the EonStor U16U along with all it's major components. The location of active components is described and the brief descriptions of each component are also given. After reading this chapter a user should be familiar with the different active components and their location on the subsystem. A brief introduction to subsystem monitoring and hot-swappable components is also given.

- ***Chapter 2: Installation***

  This chapter shows users how to correctly install the EonStor U16U (ES U16U) RAID subsystem. Installation pre-requisites, precautions and unpacking instructions are also given. Components that need to be installed include the optional battery backup unit and the battery charger board, the hard drives and the drive trays. A description of DIMM module upgrading is also given.

- ***Chapter 3: Subsystem Monitoring***

  This chapter teaches the user how to use LEDs to monitor the status of ES U16U active components. The RAIDWatch GUI and Firmware is briefly introduced and audible alarms, with activation thresholds are also described.

- ***Chapter 4: Subsystem Connection and Operation***

  This chapter teaches users how to connect the ES U16U to a host computer. Two different configurations are shown with brief descriptions of each. This chapter also describes both the power on and power off procedure of the ES U16U.

- ***Chapter 5: System Maintenance***

  This chapter instructs users on how to maintain their subsystem. The replacement and maintenance of a number of active components including the controller module, the power supply units and the cooling FAN modules are discussed. Replacement of failed battery modules and DIMM modules are also described.

- ***Appendix A: EonStor U16U Features***

  This appendix describes a few of the many features of the ES U16U.

- ***Appendix B: EonStor U16U Specifications***

This appendix lists all the technical specifications of the ES U16U RAID subsystem.

- ***Appendix C: EonStor U16U Packaging***

  This appendix completely describes the ES U16U package that a user will receive.

- ***Appendix D: Accessories and Spare Parts***

  This appendix lists all the part numbers for the different accessories and spare parts that are available for the ES U16U

- ***Appendix E: Pin Outs***

  This appendix shows the different pin outs of the ES U16U subsystem. Pin outs for the SCSI host ports, RS-232C Audio Jack and the RJ-45 Ethernet connector are among those specified.

Who should read this manual?

This manual assumes that its readers are experienced with computer hardware installation and are familiar with storage enclosures.

Related Documentation

- Generic Operation Manual
- RAIDWatch User's Manual

Conventions

Naming

From this point on and throughout the rest of this manual the EonStor series is referred to as simply the "subsystem" or the "system" and EonStor is frequently abbreviated as ES.

Warnings

Warnings appear where overlooked details may cause damage to the equipment or result in personal injury. Warnings should be taken seriously. Warnings are easy to recognize. The word "warning" is written as "**WARNING**", both capitalized and bold and is followed by text in italics. The italicized text is the warning message.

Cautions

Cautionary messages should also be heeded for the messages can help you reduce the chance of losing data or damaging the system. Cautions are easy to recognize. The word "caution" is written as "CAUTION", both capitalized and bold and is followed by text in italics. The italicized text is the cautionary message.

Notes

These are messages that are used to inform the reader of essential but non-critical information. These messages should be read carefully and any directions or instructions contained herein can help you avoid making mistakes. Notes are easy to recognize. The word "note" is written as "NOTE", it is both capitalized and bold and is followed by text in italics. The italicized text is the cautionary message.

Lists

Bulleted Lists: - Bulleted lists are statements of non-sequential facts. They can be read in any order. Each statement is preceded by a round black dot " ● ".

Numbered Lists: - Numbered lists are used to describe sequential steps a user should follow in order.

Software and Firmware Updates

Please contact your system vendor or visit Infortrend's FTP site (ftp.infortrend.com.tw) for the latest software or firmware updates. ***NOTE*** that the firmware version installed on your system should provide the complete functionality listed in the specification sheet/user's manual. We provide special revisions for various application purposes. Therefore, DO NOT upgrade your firmware unless you fully understand what a firmware revision will do.

Problems that occur during the updating process may cause unrecoverable errors and system down time. Always consult technical personnel before proceeding with any firmware upgrade.

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Chapter 1: Introduction

1.1. Chapter Overview

This chapter:-

1. Introduces the 3U, 16 Bay, SCSI-to-SCSI EonStor (ES) subsystems (ES U16U).
2. Introduces the model variations.
3. Introduces the different active components on the subsystem.
4. Introduces the different monitoring techniques.

After reading this chapter a user should:-

1. Have a good overview the ES U16U subsystem series.
2. Be well acquainted with the different active components and their location in the subsystem.
3. Have an idea of the different subsystem status monitoring techniques that can be used.

1.2. Product Overview

1.2.1 Product Introduction

This hardware manual briefly introduces the EonStor (ES) U16U-G4010 (ES U16U) SCSI-to-SCSI storage subsystems shown in ***Figure 1-1***.

Figure 1-1: ES U16U storage subsystem

The ES U16U subsystem series comes in four models (see ***Table 1-1***). All the models come with two 320MB/sec SCSI (SCSI-320) host channels and are able to support up to 16, hot-swappable, SCSI-320 hard drives. Two hot-swappable cooling fan modules protects the subsystem from over heating and two, hot-swappable power supply unit (PSU) modules provide a constant power supply to the subsystem. The modular nature of the subsystem and the easy accessibility to all major subsystem components ensures that the ES U16U can be easily maintained.

1.2.2 Model Variations

The SCSI-320 ES U16U subsystems come in four different models. Two models come with four SCSI-320 (two host and two drive) channels and two models come with six SCSI-320 (two host, two expansion and two drive) channels. The host IO board (see ***Section 1.5.1.3***) on the six channel models comes with an additional two pre-set, SCSI-320 drive channels that are connected to external expansion connectors. These additional expansion channels are facilitated by the presence of an additional chip on the host IO board itself.

One four channel model and one six channel model comes with a 256MB pre-installed DIMM module whereas the other two models (one four channel and one six channel) come with a 512MB DIMM module. (See ***Section 1.5.1.2***)

Model variations are shown in ***Table 1-1*** below:

ES U16UG4010	-42-0030	-45-0030	-62-0030	-65-0030
Host Channels (CH0 and CH1)	2 x SCSI-320	2 x SCSI-320	2 x SCSI-320	2 x SCSI-320
Drive Channel (CH2 and CH3)	2 x SCSI-320	2 x SCSI-320	2 x SCSI-320	2 x SCSI-320
Expansion Channels (CH4 and CH5)	0	0	2 x SCSI-320	2 x SCSI-320
DIMM Module	256MB	512MB	256MB	512MB

Table 1-1: ES U16U-G4010 Subsystem Model Variations

1.2.3 Enclosure Chassis

The ES subsystem enclosure is divided into a front and rear section.

NOTE:
*Components accessed through the front panel are referred to as "**Front Panel Components**" and Components accessed through the rear panel are referred to as "**Rear Panel Components**."*

1.2.3.1 Front Section

The front section of the ES subsystem features a 4 x 4 layout for sixteen 3.5" SCSI-320 drives and houses a foldable LCD panel.

1.2.3.2 Rear Section

The rear section of the ES subsystem is accessed through the rear panel and is reserved for the RAID controller module(s), power supply units (PSU), cooling fan modules and power switches.

1.2.3.3 Midplane and Driveplane Boards

Integrated driveplane and midplane boards separate the front and rear sections of the ES subsystem. These PCB boards provide logic level signals and low voltage power paths. They contain no user-serviceable components.

1.2.4 SCSI-320 Channels

Two of the ES U16U models have four SCSI-320 channels. The other two models have six SCSI-320 channels. The channels are configured as shown in ***Table 1-2***:

Channel Type	Channel Assignment
Host	CH0 and CH1
Drive	CH2 and CH3
Expansion (Configured as drive channels)	CH4 and CH5

Table 1-2: Channel Pre-configurations

The following two diagrams show the data paths for the six channel and four channel models.

1.2.4.1 6 Channel Bus Diagram

Figure 1-2 below shows a 6-channel (ES U16U-G40106) RAID subsystem cascaded to a JBOD. Channels 0 and 1 are connected to host computers. Channels 2 and 3 connect to the disk drives housed in the RAID subsystem. Channels 4 and 5 connect to an expansion module (JBOD).

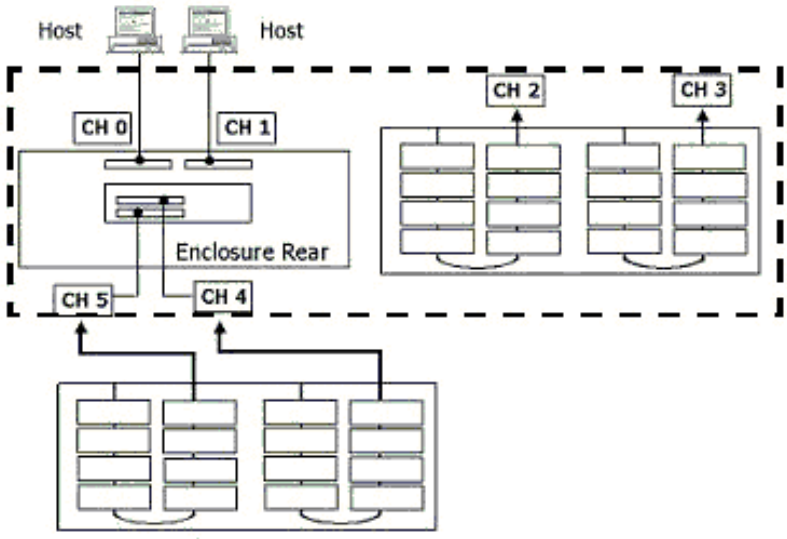

Figure 1-2: Data Path Diagram – Cascaded Enclosures

1.2.4.2 4 Channel Bus Diagram

Figure 1-3 below shows a 4-channel (ES U16U-G40104) RAID subsystem. Channels 0 and 1 are connected to host computers. Channels 2 and 3 connect to the disk drives housed in the RAID subsystem. There are no SCSI ports on the controller box.

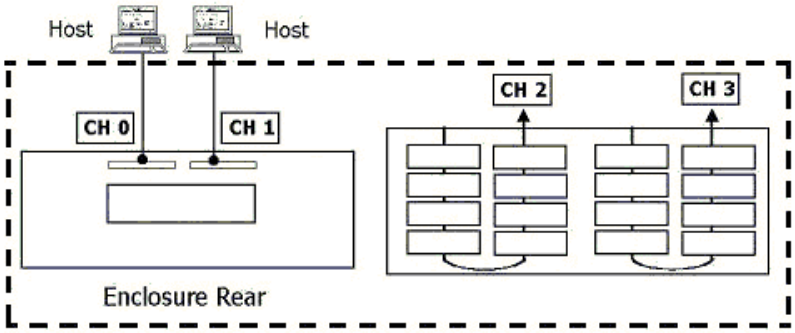

Figure 1-3: Data Path Diagram – RAID Array Enclosure

1.3. ES Subsystem Components

All the active components on the ES subsystems can be accessed through either the front or rear panel. The modular design of the active components facilitates their easy installation and removal. Hot-swap mechanisms are incorporated to eliminate power surges and signal glitches that might happen while removing or installing these modules.

1.3.1 Front Panel Overview

The front panel of the ES RAID subsystem described in this manual is shown ***Figure 1-4***. A description of each front panel component is given below.

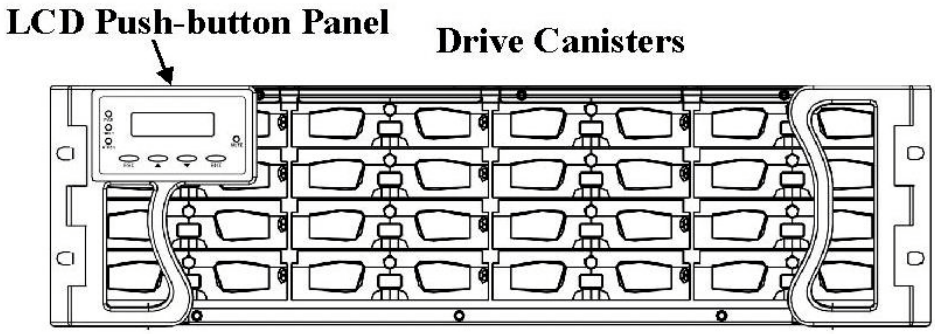

Figure 1-4: Front View – RAID Appliance Models

The front panel shown in ***Figure 1-4*** is designed to accommodate the following components:

- ***LCD Panel:-*** The LCD Panel shows system information and can be used to configure and monitor the ES subsystem.

- ***Drive bays with drive tray canisters:-*** The drive bays are used to house the ES subsystem hard drives.

1.3.2 Rear Panel Overview

The rear panel of the RAID subsystems described in this manual is shown in ***Figure 1-5***. A description of each rear panel component is given below.

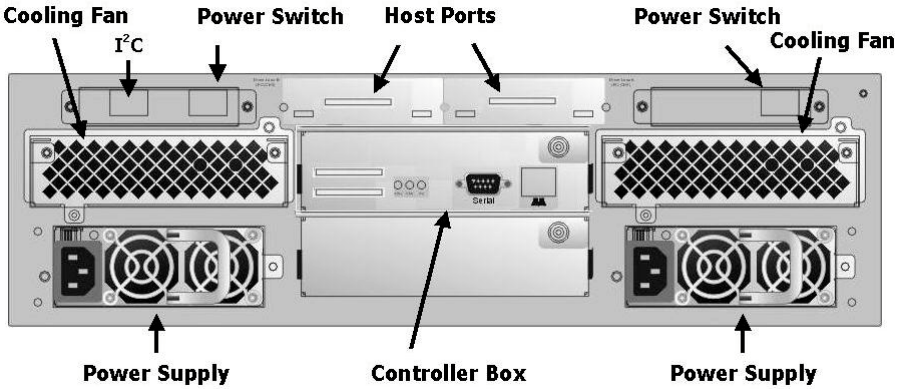

Figure 1-5: ES U16U Subsystem Rear View

The rear panel shown in ***Figure 1-5*** is designed to accommodate the following components:

- ***Controller Box*:-** The controller box contain both the RAID controllers and the optional battery back up units (BBU).
- ***PSU:-*** The PSUs are used to provide power to the subsystem.
- ***Cooling fan modules:-*** The redundant cooling FAN modules are used to ventilate the subsystem and to reduce the temperature within the subsystem.
- ***Power Switches:-*** The power switches are used to turn the system on and off.

1.4. Front Panel Components

1.4.1 LCD Panel

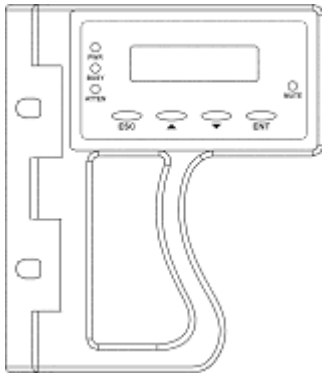

Figure1-6: LCD Panel

The LCD panel shown in ***Figure1-6*** consists of a 16x2 character LCD screen with push buttons and LED status indicators. The LCD front panel provides full access to all RAID configurations and monitoring. After powering up the subsystem, the initial screen will show the subsystem model name. A different name may be assigned for the system or different arrays. This will enable easier identification in a topology with numerous arrays.

1.4.2 Enclosure Bay ID Allocation

16 Drive bays for the installation of standard 1" pitch, 3.5" disk drives. The drive bays are located on the front panel and are easily accessible to the end user.

As shown in ***Figure1-7*** below, the ES subsystem is housed in an enclosure that is 4 bays wide by 4 bays high. Drive bays (slots) are, when viewed from the front, numbered 1 to 16 from left to right, then from top to bottom.

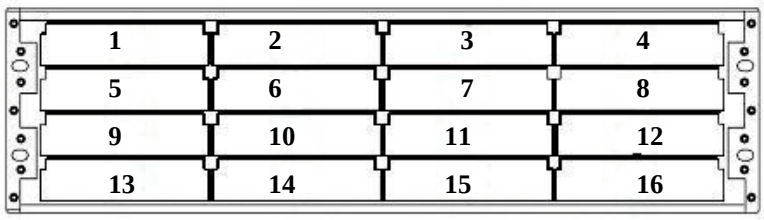

Figure1-7: Hard Drive IDs

The default ID for slot 0 is located at the top left hand corner and is set to "1." This setting should not cause any problems if the hard drives installed in this subsystem do not share the same loop with other devices. The last slot ID, located at the bottom right hand corner, will be "16".

NOTE:
Users cannot change the default ID settings for the drives. The ID settings for the drive are pre-assigned.

1.5. Rear Panel Components

1.5.1 The RAID Controller Module

The RAID controller module contains a main circuit board, necessary support interfaces and an optional BBU. The controller module contains no user-serviceable components. Except when replacing a faulty unit, installing a BBU or installing/upgrading the cache memory inside the controller module should never be removed or opened.

WARNING:

Although the RAID Controller can be removed, the only time a user should touch the controller itself is to replace the memory modules or to install the BBU. The RAID controller is built of sensitive components and unnecessary tempering can damage the controller.

1.5.1.1 Controller Board

The heart of the ES U16U RAID controller subsystem is the IFT-3260 SCSI-to-SCSI controller board. The IFT-3260 controller comes with two, pre-set SCSI-320 host channels, CH0 and CH1, and two, preset SCSI-320 drive channels, CH2 and CH3.

The IFT-3260 controller is mounted onto the base of the controller module beneath the host IO board. The DIMM module is located on the controller board and, when the DIMM module is changed, the controller module must be disassembled and the host IO board removed from the controller board.

In the 6-channel model (ES U16U-G4010-6) the host IO board that is mounted above the controller board has two extra pre-set, SCSI-320 drive channels (CH4 and CH5) that are connected to external SCSI connectors for expansion purposes.

Docking connectors at the rear of the controller board are used to connect the controller module to the mid-plane board. Two board-to-board connectors for a BBU charger board are also strategically placed in an easily accessible location on the controller board.

1.5.1.2 DIMM Modules

The ES subsystem is able to support SDRAM DIMM modules between 256MB and 1GB. It should be noted that all the controller models come with either a 256MB or 512MB pre-installed DIMM module. The size of the DIMM module selected depends on the model purchased. The DIMM module is located on the controller board beneath the host IO board. See ***Table 1-1***.

1.5.1.3 Host IO Board

The host IO board is mounted on the IFT-3260 controller board by the way of two board-to-board connectors and secured to the controller with six retention screws. Four retention screws are inserted into spacers which are connected to the controller board. The other two retention screws are inserted directly into the controller module chassis. The host IO board is secured to the controller rear panel with two retention screws on the serial port and four retention screws on the expansion SCSI connectors.

The host IO board is connected to the mid-plane with a single connector. VHDCI connectors allow for host-side connection (CH0 and CH1).

Two host IO board variations are available (see ***Table 1-1***). The host IO board that comes with the four channel models (IFT-9270UDU4S4) does not have a chip or any of the external expansion connectors. The host IO board that comes with the 6 channel models (IFT-9270UDU4S6) comes with an additional chip onboard and with two additional SCSI-320 drives that are preset as drive channels and connected to external expansion connectors.

1.5.1.4 Interfaces

The interfaces that enable the subsystem to connect to external devices are located on the IO board and accessed through the controller module rear panel shown in ***Figure 1-8***.

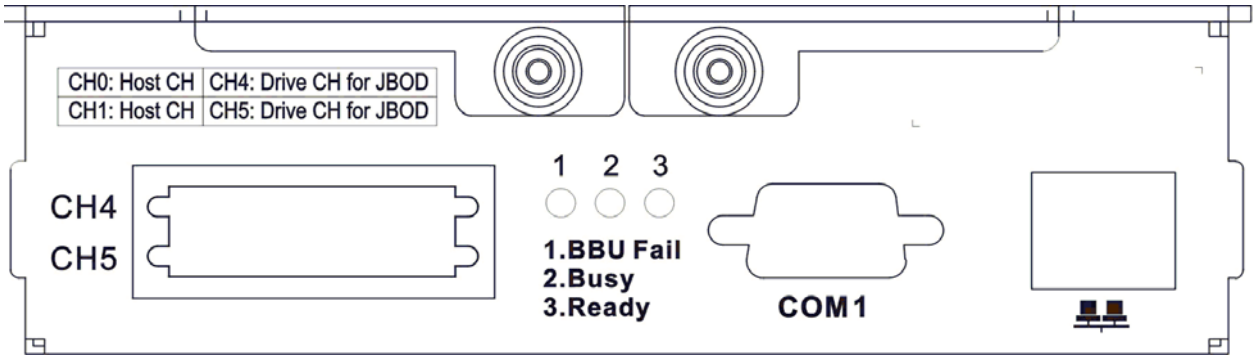

Figure 1-8: Controller Module Rear Panel

- ***Host*** – The SCSI-320 68-pin host channel VHDCI connectors are not found on the controller module. The host channels are all found at the top of the rear panel of the subsystem (see ***Figure 1-5***). These channels are used to connect the ES subsystem to the host through two VHDCI SCSI connectors.

- ***Expansion*** – The six channel models come with two SCSI-320 68-pin expansion channel VHDCI connectors marked CH4 and CH5 in ***Figure 1-8***.

NOTE:

SCSI termination: SCSI termination is automatically set when a cable is connected to a SCSI port. There is no need to change the terminator settings on SCSI channels using the configuration options in firmware. The same applies to JBOD enclosures.

- ***RS-232C*** - The controller modules all come with a single RS-232C serial port ("Serial" in ***Figure 1-8***). The serial port can be used for remote management.

- ***Ethernet Ports*** – A single RJ-45 Ethernet port (located on the right of RS-232C in ***Figure 1-8***) is used for remote management through the network.

- ***Drive*** - All the models come with SCSI-320 drive channels that are connected to the back plane through connectors on the IO board. (***Note:*** *the drive interfaces are not accessed through the controller module rear panel. They are accessed through the rear panel*)

1.5.1.5 Drive Bay Interfaces

The controller comes with 2 SCSI-320 drive channels (CH2 and CH3) that connect to the physical drives through the backplane that separates the front section of the subsystem from the rear section. Each drive channel has been pre-assigned 8 drives through which data and IO commands will be transmitted. The drives, and the drive channels to which they have been assigned are shown in ***Figure 1-9***.

Drives Assigned to CH3		Drives Assigned to CH2	
CH3-ID8 (Slot 1)	CH3-ID12 (Slot 2)	CH2-ID8 (Slot 3)	CH2-ID12 (Slot 4)
CH3-ID9 (Slot 5)	CH3-ID13 (Slot 6)	CH2-ID9 (Slot 7)	CH2-ID13 (Slot 8)
CH3-ID10 (Slot 9)	CH3-ID14 (Slot 10)	CH2-ID10 (Slot 11)	CH2-ID14 (Slot 12)
CH3-ID11 (Slot 13)	CH3-ID15 (Slot 14)	CH2-ID11 (Slot 15)	CH2-ID15 (Slot 16)

Figure 1-9: Drive Channel Drive Assignment

1.5.1.6 Battery Backup Unit

An optional Li-ON BBU (IFT-9270UBT), shown in ***Figure 1-10***, can be purchased separately by users and is able to sustain the 512MB of cache memory for up to 72 hours after a power failure. Although only an option, purchasing of a BBU is highly recommended for the safe-guarding of data integrity.

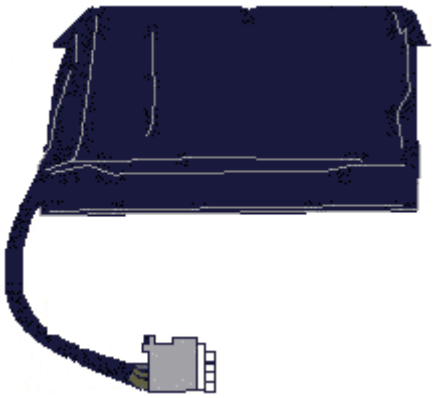

Figure 1-10: BBU Module

If a user intends to install a BBU, a battery charger board (IFT-9070E) shown in ***Figure 1-11*** must initially be mounted on the controller board. The battery charger board comes with a connector that is attached to the BBU

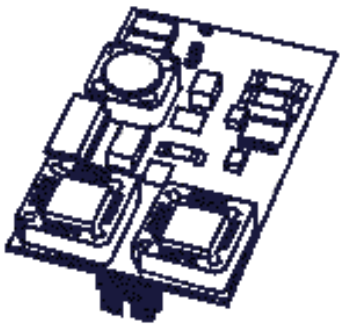

Figure 1-11: Battery Charger Board

1.5.2 I²C Enclosure Monitoring:

Various sensors and components within the enclosure are linked by an I^2C serial bus. When a JBOD is cascaded to a RAID system, connect the I^2C link so that its status can be seen by the ES U16U. The controller firmware then collects information and reports component status through its management interfaces.

1.5.3 Power Supply Units

The ES U16U subsystems are equipped with two redundant, hot-swappable, 1U, 460W power supply unit (PSU) modules (see ***Figure1-12***). The PSU modules are located on the rear panel of the subsystem and can be found on either side of the controller modules (see ***Figure 1-5***).

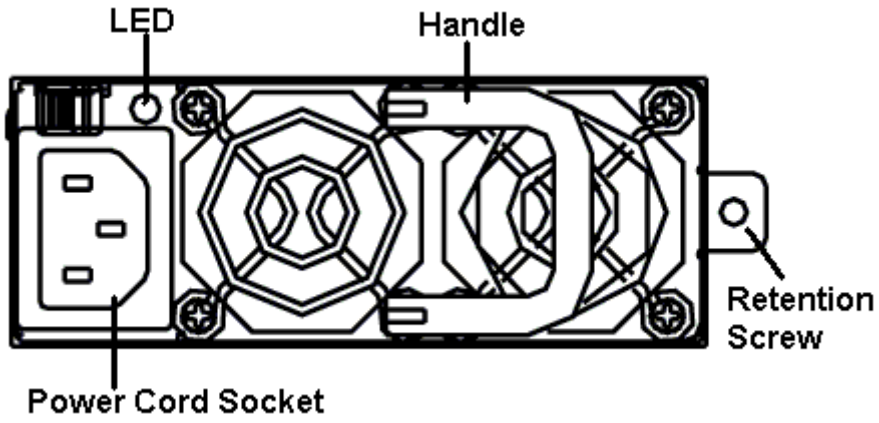

Figure1-12: PSU Module Rear View

Each PSU comes with a single power socket for power cord plug-in and is attached to a single power switch located directly above it that will enable users to turn the PSU on and off. Each PSU also comes with two embedded cooling fans that will provide sufficient airflow to keep the PSU cool. A single LED is used to indicate the PSU status. A handle at the back of the PSU has been especially designed to enable users to remove the PSU from the subsystem while the system is still online. This should only be done if the PSU has failed and needs to be replaced.

A retention screw on the right side of the PSU module is used to secure the PSU to the enclosure. If the PSU needs to be removed, the retention screw must be removed first. When installing a new PSU module, make sure that the retention screw has been firmly secured.

The specifications for the PSUs are shown in ***Table 1-3*** below.

Specification		
Nominal power	460 Watts with active PFC	
Input voltage	100 to 240VAC +-10%	
Input frequency	47 ~ 63 Hz	
Input current	8A @90VAC; 4A @230VAC	
Power factor correction	Yes	
Hold-up time	At least 16ms at 115/230VAC full load after a loss of AC input	
Over temperature protection	Lost cooling or excessive ambient temperature	
Size	265(D) x 107(W) x 42.2(H) mm.	
Cooling	11 CFM	
Acoustic noise	115V input, full load of +5V; 0.5A of +12V	50 dB max.

Table 1-3: PSU Specifications

1.5.4 Cooling fan modules

ES U16U subsystems come with two 1U dual-blower, redundant, hot-swappable cooling fan modules, shown in ***Figure 1-13***, pre-installed in the subsystem. Two 9.7cm blowers are housed in each cooling module and can provide a total of 61 CFM of airflow running at the speed of 3600rpm. These modules have been designed to generate a cooling airflow from the front to the rear of the subsystem, which will enable the heat generated by the SCSI-320 hard drives to be extracted. The cooling fan modules are installed directly above the PSUs.

Any of the two blowers inside the module can be replaced separately provided that a faulty unit is quickly replaced and re-installed.

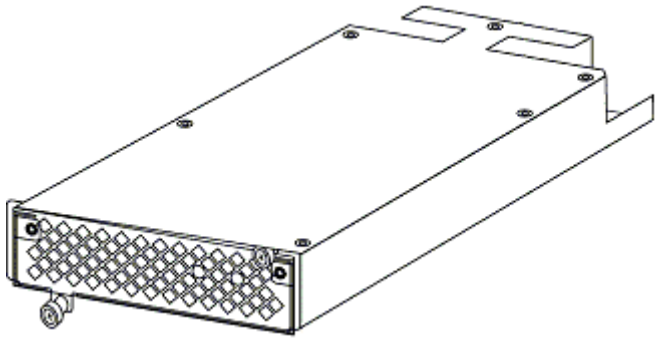

Figure 1-13: Bottom view of a cooling fan module

1.6. ES Subsystem Monitoring

The ES RAID Subsystem comes with a number of different monitoring methods that enable users to constantly be updated on the status of the system and individual components. The following monitoring features are included in the subsystem.

1.6.1 I²C bus

The following ES subsystem elements are interfaced to the RAID controller over a non-user serviceable I^2C bus:

- PSU
- Cooling FAN Module

1.6.2 LED Indicators

The following active components all come with LEDs that indicate the status of the individual component.

- RAID Controller
- LCD Panel
- Cooling FAN Module
- PSU Module
- Drive Trays

1.6.3 Firmware (FW) and RAIDWatch GUI

Firmware:- The firmware is pre-installed software that is used to configure the subsystem. The FW can be accessed through either the front panel LCD module or a terminal emulation program that is installed on an external computer that is connected to the host.

RAIDWatch:- RAIDWatch is a premier web-based graphics user interface (GUI) that can be installed on a remote computer and accessed via the web.

1.6.4 Audible Alarms

The ES subsystem comes with audible alarms that will be triggered when certain active components fail or when certain (controller or subsystem) thresholds are exceeded. If you hear an audible alarm being emitted from the ES subsystem it is imperative that you determine and rectify the problem immediately.

WARNING:
Failing to respond when an audible alarm is heard can lead to permanent damage of the ES subsystem. If an audible alarm is heard, rectify the problem as soon as possible.

1.7. Hot-Swappable Components

1.7.1 Hot-Swap Capabilities

The ES U16U subsystem comes with a number of hot-swappable components. A hot-swap component is one that can be exchanged while the subsystem is still online without affecting the operational integrity of the subsystem. These components should only be removed from the subsystem when they are being replaced. These components should, at no other time, be removed from the subsystem.

1.7.2 Components

The following components are all hot-swappable:

- The power supply units (PSUs)
- The cooling fan modules
- The hard drives

1.7.3 Normalized Airflow

Proper subsystem cooling is referred to as "normalized" airflow. Normalized airflow is required to ensure the sufficient cooling of the subsystem and is only attained when all the components are properly installed. A failed component should therefore only be hot-swapped when a replacement is available. If a failed component is removed but not replaced, permanent damage to the subsystem can result.

1.8. Connector Type, Supported Connections and Other Information

- SCIS-320 68-pin ports (0.8mm VHDCI) for connecting to host or expansion enclosure.
- Cabling length: 12 meters. Note that SCSI paths within the enclosure (an approx. 0.5m) must be discounted when cabling to external devices.
- 8 (eight) drives are connected through each drive channel.
- RJ-11 I^2C port connector

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Chapter 2: Installation

2.1. Chapter Overview

CAUTION
Please note that the installation instructions described in this manual should be carefully followed. If they are not carefully followed, the system may be damaged.

This chapter:-

1. Discusses installation pre-requisites.
2. Discusses installation safety procedures.
3. The unpacking procedure.
4. Installation/replacement of DIMM modules.
5. Installation of BBU modules, controller modules, hard drives, and drive trays.

After reading this chapter a user should:-

1. Be well acquainted with the pre-requisites required for installation.
2. Be well acquainted with the safety procedures.
3. Know how to install all the uninstalled active components into the subsystem.

2.2. Installation Pre-requisites

1. **Static Free Installation Environment** – The ES subsystem must be installed in a static free environment to minimize the possibility of electrostatic discharge (ESD) damage. (See ***Section 2.3.3***).

2. **Component Check –** Before the ES subsystem is installed, users should, during the unpacking process, check to see that they have received all the required components. (See ***Section 2.5***)

3. ***Memory Modules*** – If the users wish to change the pre-installed memory modules, the separately purchased modules must be installed by the end user. (See ***Section 2.6.1***)

4. ***Hard drives –*** SCSI-320 hard drives must be purchased separately prior to installation of the ES subsystem. (See ***Section 2.10.2*** and ***Section 2.10.3***)

5. **Cabling** – All the SCSI cables that are used to connect the ES subsystem to the host and used for the expansion port must be purchased separately. (See ***Section 4.2.1***)

2.3. Safety Precautions

2.3.1 General Considerations

- ***Power Source*** - Make sure power source is within the correct power range prior to power on.

- ***Notices*** - Under some circumstances, for instance, when there is an unused drive bay, fix an empty drive tray to an empty slot. Leaving a slot open will seriously affect the efficiency of airflow within the enclosure, and will consequently lead to system overheating.

- ***Faulty Modules*** - Leave a faulty module in place until you have a replacement unit and you are ready to replace it.

- ***Subsystem Weight*** - A subsystem can weigh up to 24 kilograms with disk drives. Two people will be required to install or relocate the subsystem. Drives should be removed from the enclosure before moving the subsystem.

- ***Airflow Consideration*** - The subsystem requires an airflow clearance especially on the front and the rear. A minimum of 2.5cm is required between the front of the enclosure and rack cover. A minimum of 5cm is required from the enclosure to the end of rack for proper ventilation.

- ***Handling the Subsystem Modules*** - Handle the system modules by the retention screws, eject levers, or the module's metal frame/face plate only, avoid touching the PCB boards or connector pins.

- ***Covers*** - None of the covers or replaceable modules should be removed for the compliance with safety, emission, or thermal requirements.

- ***Securing Modules*** - Always secure every enclosure module with the retaining screws and make sure it is held in place by latches.

- ***Earth*** - Always make sure the subsystem has a safe electrical earth connection via power cords or chassis ground by the rack cabinet.

- ***Ventilation*** - Be sure that the rack cabinet into which the subsystem chassis is to be installed provides sufficient ventilation channels and airflow circulation around the subsystem.

- ***Working Surface*** - Provide a soft, clean surface to place your subsystem before working on it. Servicing on a rough surface may damage finish of the chassis.

- ***Transporting the Subsystem*** - If it is necessary to transport the subsystem, repackage all drives and replaceable modules separately.

- ***Overcurrent Protection*** - The rack cabinet into which this subsystem is to be installed must support overcurrent protection and must not be overloaded by the modules installed. Other requirements, such as ventilation airflow, rack stabilizing features, electrical earth, and electrical distribution, must comply with the technical specifications listed for this product.

- ***Integrated Storage Solutions*** - System Integrators should ensure an integrated storage solution that consists of this product has been tested and proved meeting government regulations and codes for subjects including safety, fire, and electrical.

2.3.2 Precautions Handling Other Modules:

- ***Blank Plates*** - The RAID models have all the module bays occupied except one empty controller bay with a blank plate fitted. The blank plate should never be removed.

- ***Removing Drives*** - Although drives are hot-swappable, do not remove a drive when the system is running. Doing so you may lose data. Use the "Identify Drive" function to flash LEDs to help locate a faulty drive. Remove a faulty drive and replace it with a drive known to be good and it is better to acquire a drive of the same model and capacity.

- ***Replacing Faulty Units*** - Leave a faulty unit in bay before you obtain a replacement unit. Airflow through an empty slot will disrupt the regular airflow within the enclosure.

- ***Note on using RAID*** - No RAID system is 100 percent fault-proof, routine backup of your data is still necessary.

2.3.3 Static-Free Installation

Static electricity can damage the electronic components of the system. Most of the controllers that are returned for repair are the results of improper installation and ESD damage. To prevent ESD damage to any of the components, before touching or handling them follow these precautions:

- When installing the ES A16F, a user should wear an anti-static wrist band or touch a grounded metal surface to discharge any static electricty form his/her body.
- Avoid carpets, plastic, vinyl or styrofoam in the work area.
- Handle any components by holding its edges or metal frame. Avoid touching PCB boards or connector pins.

2.4. Hardware Installation Preparation

2.4.1 Tools or Equipment Needed for Installing the Subsystem

The only tools necessary are #2 cross-head Phillips and 3/16" slotted screwdrivers.

2.4.2 Planning Before Installation

- ***Module Locations*** - Make sure you are aware of the related positions of each plug-in module and interfaces.
- ***I/O path configurations*** - The ES subsystems provide a total of four (4) or six (6) IO channels interfaced through two (2) or four (4) SCSI ports (depending on the model type). There are always two SCSI ports for connecting to host computers. Drives channels are routed through the back-end PCBs to drives mounted within the enclosure.
- ***Expansion Ports*** - The 6-channel model provides another two SCSI ports on its controller box. These ports should be used to expand system capacity by cascading to a JBOD.
- ***SCSI Port Variations*** -
  - ***The 4 channel model***: two SCSI ports for host connection
  - ***The 6 channel model***: two SCSI ports for host connection, and two SCSI ports on the controller box for cascading to a JBOD.

- ***IO port cabling*** - All series models are equipped with 0.8mm VHDCI SCSI connectors. Please contact our technical support for an updated list of host adapters that have been tested and proved compatible with the ES U16U series.

- ***Drive Bays*** - All drive bays should be installed with drives or at least an empty tray canister.

- ***Power supplies and cooling fan modules*** - All series models come with redundant power and cooling fan modules. Operation with single module should only occur when one module fails and is being replaced.

2.4.3 General Installation Procedure

If the following steps are followed, the installation of the ES subsystem should be smooth and efficient. Detailed, illustrated instructions for each step are given in the following sections.

CAUTION
To ensure that the system is correctly installed, please follow the steps outlined below. If these steps are followed the installation will be fast and efficient. If these steps are not followed may hardware may accidentally be installed incorrectly

Step 1. ***Unpack*** – Unpack the subsystem and make sure that all the components that are meant to come with the subsystem have indeed arrived. (See ***Section 2.5***)

Step 2. ***Change the DIMM Module*** – Although a DIMM module has been preinstalled on the controller board, if a user wishes to use a different DIMM module with a larger memory capacity then the DIMM module exchange should be made first. (See ***Section 2.6***)

Step 3. ***Install optional BBU*** – Install the optional BBU prior to the operation of the subsystem. (See ***Section 2.7***)

Step 4. ***Install the Controller Module*** – Install the controller module. (See ***Section 2.8***)

Step 5. ***Rack/Cabinet installation –*** If the ES U16U is going to be installed in a rack or a cabinet, it should be installed prior to the installation of the hard drives. Installing the ES U16U into a rack or cabinet requires at least three people. (See ***Section 2.9***)

Step 6. ***Install Hard Drives –*** Separately purchased SCSI-320 hard drives must be individually installed in to the drive trays. (See ***Section 2.10.2***)

Step 7. ***Install Drive Trays*** – After the hard drives have been installed into the drive trays, the drive trays must be installed into the enclosure itself. (See ***Section 2.10.3***)

Step 8. ***Cable connection*** – Use the power cables that came with the subsystem to connect to the subsystem to the mains. Use separately purchased SCSI cables to connect the host ports to the host computers. (See ***Chapter 4***)

Step 9. ***Power Up*** – Once all the components have been properly installed and all the cables properly connected, the subsystem can be powered up and the RAID array configured. (See ***Chapter 4***)

2.5. Unpacking the Subsystem

The ES U16U subsystem will be packed in two separate levels as shown in ***Figure 2- 1*** below. Carefully check the items contained in each box before proceeding with installation.

NOTE:
A detailed packing list can be found in the ***Appendix D*** of this manual.

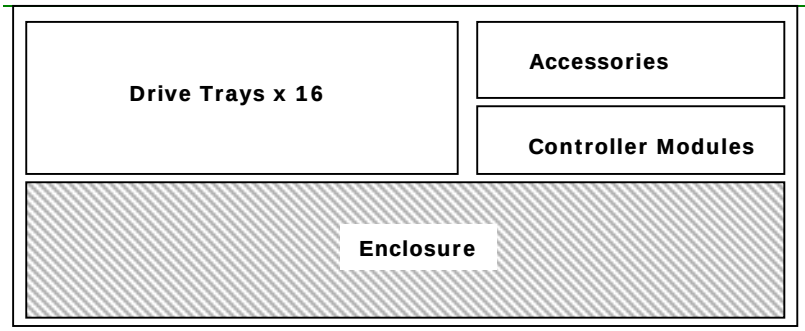

Figure 2- 1: Side View of the Packing Case

Upper Level:- The boxes on the upper level contain:

- 16 drive trays
- controller modules
- battery modules (***Optional item for single controller subsystems***)
- accessories

Lower Level:- The lower box should contain the enclosure chassis with all the pre-installed components. The pre-installed components should include:

- PSU modules
- LCD panel
- Cooling FAN modules

- Midplane
- Driveplane

Accessory items are placed on top of the controller modules. They include power cords, Audio Jack cable and a CD containing both the Hardware Manual (this document) and the RAIDWatch User's Manual.

2.6. Memory Module Installation/Upgrade

The ES subsystem comes with pre-installed SDRAM DIMMs. The sizes are shown in ***Table 2-1***.

Model	DIMM Module
ES U16UG4010-42-0030	256MB
ES U16UG4010-45-0030	512MB
ES U16UG4010-62-0030	256MB
ES U16UG4010-65-0030	512MB

Table 2-1: DIMM Module Sizes

If the user wishes to use SDRAM modules with a different size, the pre-installed modules must be removed and the new ones installed.

WARNING:

Although it is possible to change the DIMM modules, users are not encouraged to do so. It is recommended that user's carefully consider their memory requirements prior to purchasing the subsystem. If for some reason the DIMM modules do need to be changed it is advisable that it is done by an experienced engineer and that all safety precautions are strictly adhered to.

If the memory modules do not need to be changed, please move on to ***Section 2.7***. If the memory modules are going to be replaced with new ones, please refer to the installation procedure below.

2.6.1 Selecting the DIMMs

If memory modules on the ES subsystem controller are going to be replaced, when purchasing the replacement DIMM modules the following factors must be considered:

- ***Pre-Installed SDRAM DIMM*** – Please refer to ***Table 2-1*** to determine the size of the preinstalled memory module on your subsystem.

- ***SDRAM DIMM modules supported*** – The ES subsystems are able to support SDRAM DIMMs with memory capacities 256MB and 1GB.

- ***Installation Considerations*** – When installing the SDRAM DIMM module, it is necessary to handle the controller module. The controller board and host IO board are more susceptible to damage than the other components and must therefore be handled with extreme care. ALL anti-static precautions specified in ***Section 2.3.3*** must be strictly adhered to.

- ***Secure Installation*** - When replacing the DIMM module, make sure that the new DIMM module is firmly in place prior to installing the controller module. If the DIMM module is not firmly in place, the subsystem will not be able to run and the controller will need to be removed and the DIMM module correctly installed.

- ***Purchasing considerations*** – When purchasing an SDRAM DIMM to install on the controller board, contact the EonStor subsystem vendor.

2.6.2 DIMM Module Upgrade Procedure

To upgrade a DIMM module into the ES U16U subsystem, please follow these steps:

Step 1. ***Remove the controller Module*** – If the controller module has already been installed at the rear of the ES U16U chassis it must be removed. To remove the controller module ***loosen the hand retention screws*** that appear on the rear panel of the controller module. Gently open the rear flaps and carefully ***pull the controller module out*** of the Chassis. (For more detailed instructions please see ***Chapter 5***)

Step 2. ***Remove the IO board retention screws-*** The IO board is mounted above the controller board. The IO board is connected to the controller module with 6 retention screws, two pass through cylinders that are attached directly to the controller chassis and four pass through the spacers that are connected to the controller board. (See ***Figure 2-1***)

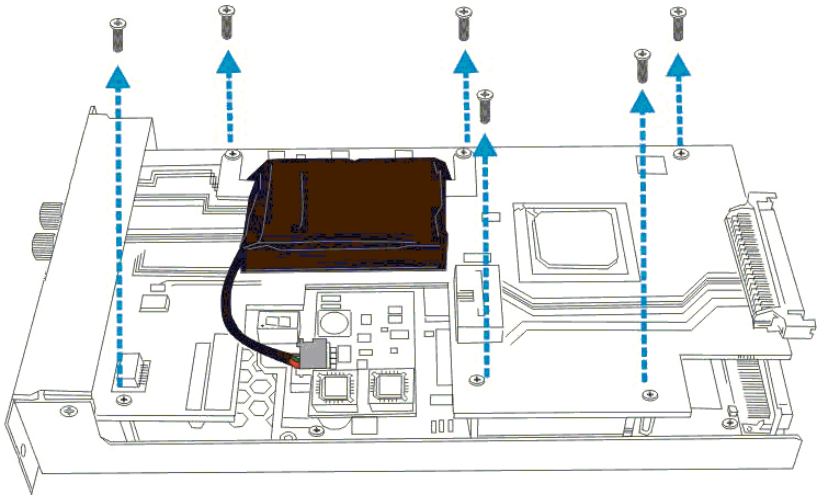

Figure 2-1: Remove the Retention Screws

Step 3. ***Remove the Optional BBU and charger board–*** If a BBU has been installed on the IO board, both the BBU and the charger board should be removed. To remove the BBU disconnect the BBU connector from the battery charger. Note: the retention screws that connect the BBU to the IO board were removed in ***Step 3*** above. Once the BBU has been removed, gently pull the charger board in an upward direction until the board-to-board connectors are separated from those on the controller board. (See ***Figure 2-1***)

Step 4. ***Remove the Interface Retention Screws*** - There are also retention screws on the rear panel of the controller module that connect the six channel expansion port SCSI connectors and the RS-232C serial port that are connected to the host IO board, to the rear panel of the controller module. ***Remove all these retention screws***. See ***Figure 2-2***.

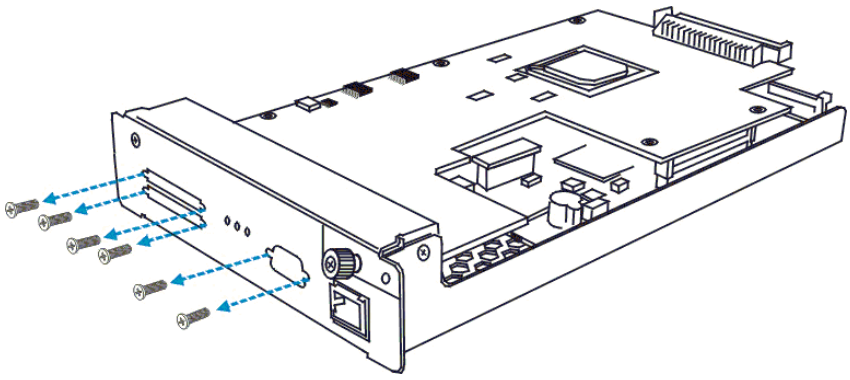

Figure 2-2: Remove the Interface retention screws

Step 5. ***Remove the host IO Board –*** The host IO board is linked to the controller board through a set of board-to-board connectors***. Gently lift the IO board in an upward direction*** disconnecting the board-to-board connectors from each other.

When lifting the IO board it is best to elevate the back end of the board and then, before sliding it out of the module, place it at a slight angle to the controller module (see ***Figure 2-3***). Once the IO board has been removed, place it on a dry, safe, static free surface to prevent damage.

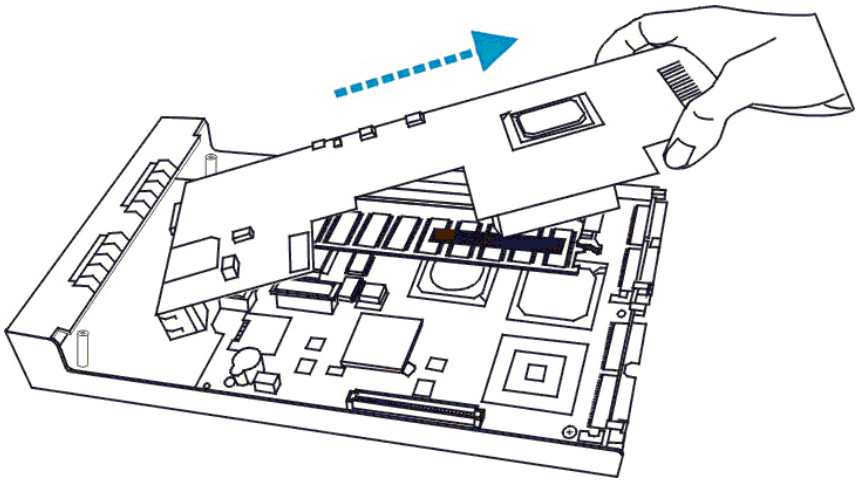

Figure 2-3: Remove the Host IO Board

Step 6. ***Remove the pre-installed DIMM*** –The DIMM slot should now be visible with the currently installed SDRAM DIMM module. ***Gently open the white clips*** on either side of the slot and the DIMM module will be dislodged. Remove the DIMM module placing it in a safe place.

Step 7. ***Insert the new DIMM Module - Line the new SDRAM DIMM module up with the slot*** and gently (but firmly) push it in. The white clips on either side of the slot should automatically close and lock the new SDRAM DIMM module into place. (See ***Figure 2-4***)

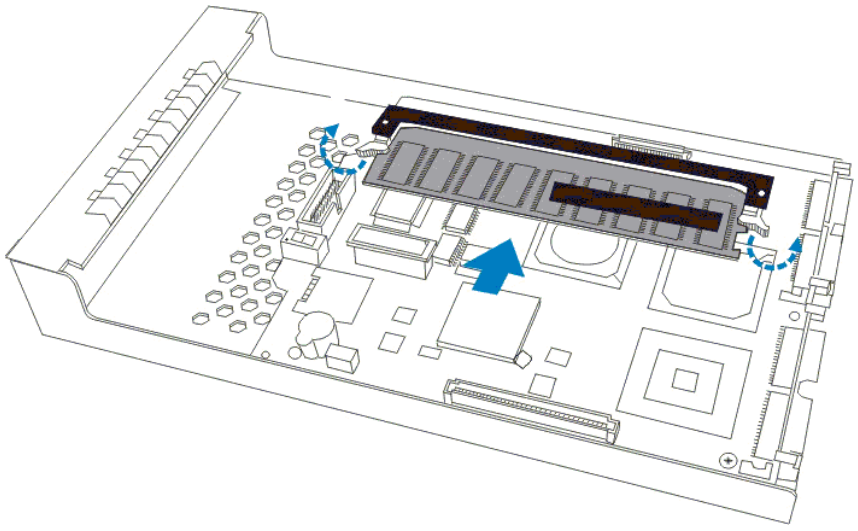

Figure 2-4: DIMM Installation

Step 8. ***Replace the IO board –*** Hold the back of the board in an elevated position, angle the board at a slight angle to the controller module and gently slide the host IO board into the controller module (see ***Figure 2-5***). First ensure that the front panel interfaces are correctly aligned with their respective locations on the controller module rear panel. Next, align the board to board connectors with from the host IO board with those on the controller board. Gently push down on the controller board ensuring a proper connection between the board-to-board connectors.

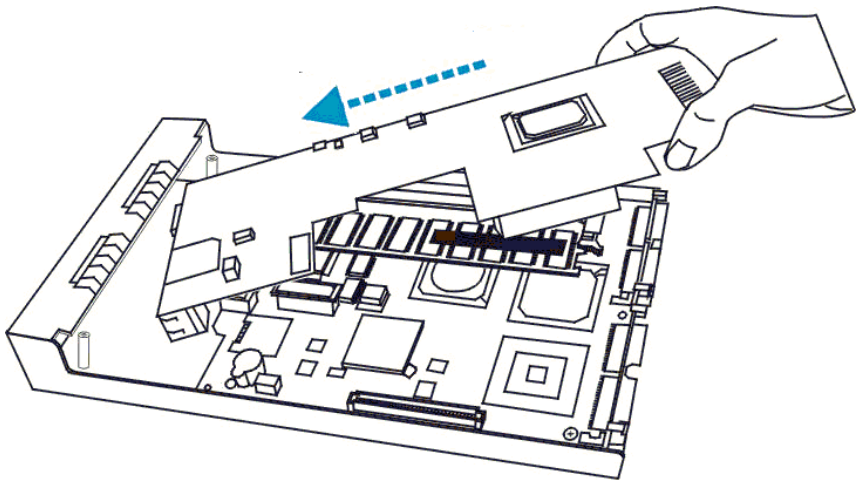

Figure 2-5: Re-inserting the host IO board

Step 9. ***Re-install the optional BBU with the charger board –*** If an optional BBU module was previously installed, both it and its associated charger board should be re-installed now. Detailed installation instructions for the BBU installation procedure can be found in ***Section 2.7.2***.

Step 10. ***Re-insert all the retention screws*** – Re-install all the retention screws that were removed from both the rear panel interfaces and the host IO board. Note that if these retention screws are not reinserted, the host IO board will not be properly secured to the controller module. It is therefore imperative that all the retention screws that were removed are replaced.

Step 11. ***Reinsert the Controller Module –*** If an optional BBU module is not going to be installed, the controller can be installed. To install the controller align the controller module with the controller bay and gently slide it in. Once has been fully inserted into the rear of the subsystem, close the rear flaps and secure the controller module to the ES U16U enclosure by ***tightening the hand retention screws*** on the back of the controller module. (For more detailed instructions please see ***Section 2.8***)

2.7. BBU Installation

2.7.1 About the BBU Installation

Users are free to purchase an optional BBU module that is able to sustain a 512MB cache memory for up to 72 hours in the event of a power failure or in the (extremely unlikely) event of both PSUs failing. Purchasing and installing a BBU is highly recommended. The optional BBU provides additional data security and helps to minimize the loss of data during power shutdowns.

The BBU comes with the battery unit itself and a battery charging board. Both these items must be installed.

2.7.2 BBU Installation Procedure

To install a BBU module into the ES U16U subsystem, please follow these steps:

Step 1. ***Remove the controller Module*** – If the controller module has already been installed into the ES U16U chassis, it must be removed. To remove the controller module ***loosen the hand retention screws*** that appears on the rear panel of the controller module. Gently open the rear flaps and then gently ***pull the controller module out*** of the Chassis. (For more detailed instructions please see ***Chapter 5***)

Step 2. ***Remove the Battery connector cap –*** When shipped, in place of a battery charger board, the battery charger connector (located on the controller board) will have a pre-installed Battery connector cap. ***Remove this cap***. (See ***Figure 2-6***)

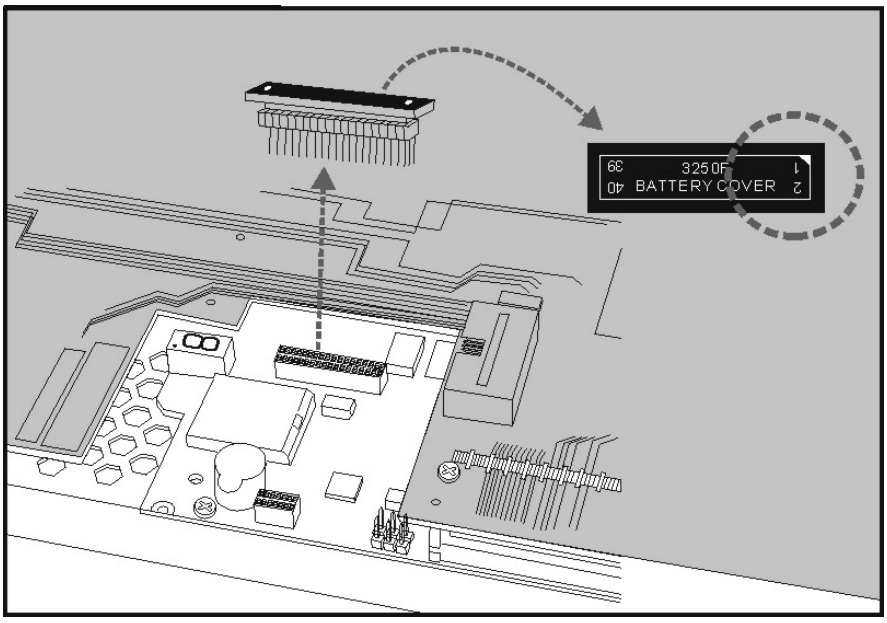

Figure 2-6: Remove the Battery connector cap

Step 3. ***Mount the Battery Charger Board –*** The BBU module will come with a battery charger board. This is connected to the controller board through two board-to-board connectors. Correctly orient the charger board and align its board-to-board connectors with those on the controller board as shown in ***Figure 2-7***. Place the charger board onto the connectors and gently but firmly push the charger board in a downward direction making sure that the connectors are firmly attached.

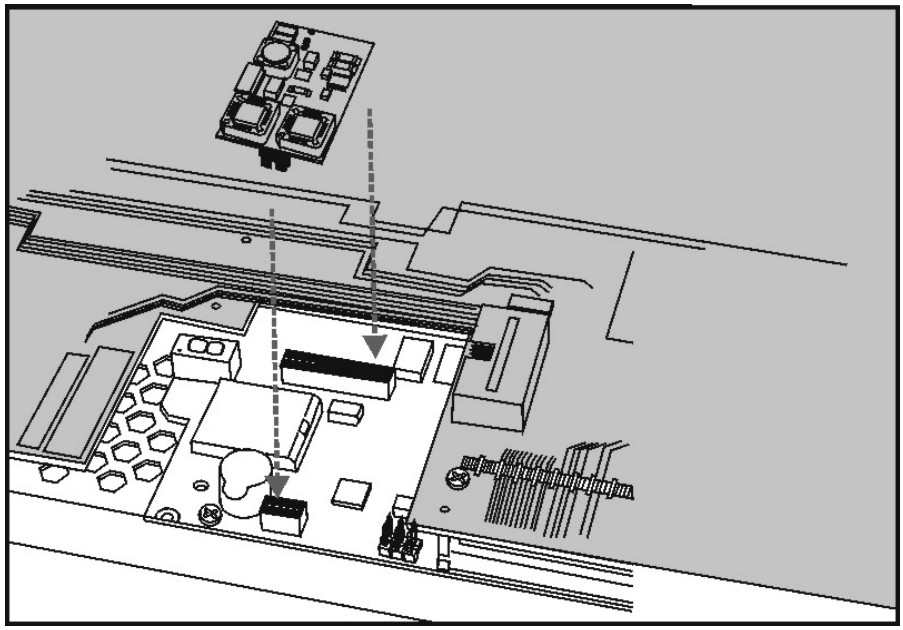

Figure 2-7: Insert the Battery Charger Board

Step 4. ***Remove two IO Board retention screws –*** The BBU is attached to the controller module with two retention screws. These screws are already used to connect the IO board to the controller board. If the controller rear panel is facing you, these screws can be found on the right hand side of the IO board. Remove them. See ***Figure 2-8***.

Step 5. ***Connect the BBU connector -*** Connect the BBU connector to the connector on the battery charger board. Make sure this connection is secure. See ***Figure 2-8***.

Step 6. ***Insert the retention screws –*** Align the BBU mounting brackets with the location of the previously removed retention screws. Once aligned, reinsert the retention screws making sure that each one passes through one of the BBU brackets, through the IO module and into the spacer that is used to mount the IO board onto the controller. See ***Figure 2-8***.

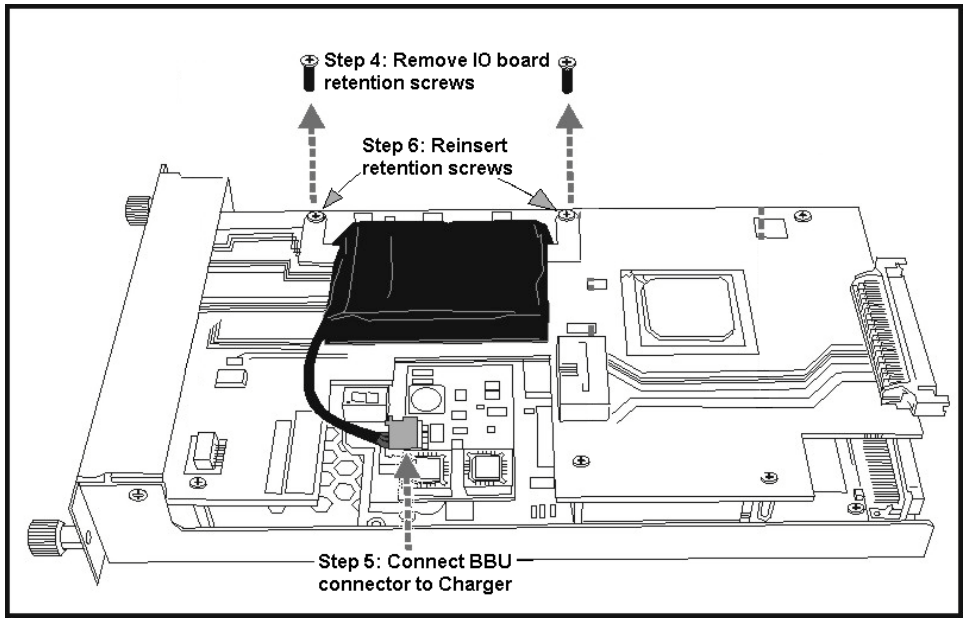

Figure 2-8: Install BBU

Step 7. ***Install the Controller Module –*** Once the BBU module has been installed the controller module can be installed. To install the controller module align it with the controller bay and gently slide it in. Once has been fully inserted into the rear of the subsystem, close the rear flaps and secure them to the controller module by ***tightening the hand retention screws*** on the back. (For more detailed instructions please see ***Section 2.8***)

2.8. Installing the RAID Controller Module

To install the controller module, please follow these steps:

Step 1. ***Hold the RAID controller unit by its edges*** and insert it into the controller bay. Push the unit in until it reaches the end of the controller bay. The guide rails on the sides of the controller bay should make the plug-in process an effort-less task. You should be able to feel the contact resistance of the docking connector when pushing the controller inwards.

Step 2. ***Pull the ejector handles outwards*** and orient them to an angle of approximately 15 degree relative to the controller rear panel. Carefully orient them so that the notches on the handles can lock onto the protruded edge of enclosure rail on the sides. This is crucial for the positive insertion of the controller unit. (See ***Figure 2- 2***)

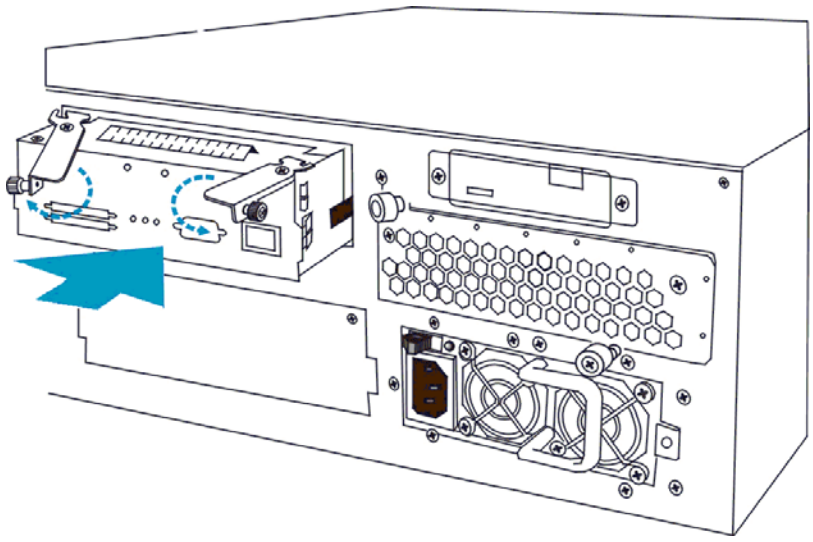

Figure 2- 2: Inserting the Controller Module

Step 3. Secure the controller module to the enclosure by fastening the hand screw. Insert the retention screw on the right hand side of the ejector handle.

2.9. Mounting the Enclosure

2.9.1 Enclosure Mounting Considerations

- ***Minimum Depth*** - The minimum depth required for installing the chassis is 500mm plus an extra 50mm to be available to the back of the enclosure for proper ventilation and cabling connection.

- ***Mounting Brackets*** - If the rear mounting brackets are used, another 80mm of space is required for installing the enclosure.

- ***Front Clearance*** - One inch of clearance is also required at the front of the enclosure if your rack cabinet has a rack door or front cover. This clearance is necessary for adequate airflow circulation.

- ***Rack/Cabinet Compatibility*** - The enclosure width fits in standard 19" rack or cabinet.

- ***Mount the enclosure first and then install disk drives. Enclosure with its drives installed will be too heavy to handle.***

2.9.2 Slide Rail Availability

Infortrend currently provides two slide rails for ES U16U rack-mounting. These slide rails, which are listed below, must be purchased separately as accessory items. The available slide rails are:

- ***IFT - 9270CSlider36-0010*** - Slide rails for 26"~36" deep rack

- ***IFT - 9270CSlider32-0010*** - Slide rails for 24"~32" deep rack

Please refer to the installation guide that came with the slide rails for further instructions on how to mount a 3U ES U16U subsystem into a rack or cabinet.

2.10. Hard Drive and Drive Tray Installation

WARNING:

1. *Handle hard drives with extreme care. Hard drives are very delicate. Dropping a drive onto a hard surface (even over a short distance), hitting or contact with the circuits on the drives by your tools, may all cause damage to drives*

2. *Observe all ESD prevention methods when installing drives.*

2.10.1 Hard Drive Installation Pre-requisites

NOTE:

The hard drive and drive trays should only be installed into the subsystem once the subsystem has been mounted into a cabinet. If the hard drives are installed first then the subsystem will be too heavy and mounting it in the cabinet will be far more difficult.

Hard drives for the ES subsystem must be purchased separately. When purchasing the hard drives, the following factors must be considered:

- ***Capacity (MB / GB)*** **–**Use drives with the same capacity. RAID arrays use a "least-common-denominator" approach. The maximum capacity of each drive the array can use is the maximum capacity of the smallest drive. Choose big drives of the same size.

- ***Profile*** **–** The drive trays and bays of the system are designed for 3.5" wide x 1" high hard drives. It is highly recommended that users do not try to use drives of any other size.

- ***Drive Type*** **–** The ES subsystem described in this manual can ONLY use SCSI-320 hard drives. Please ensure that you purchase the correct hard drives.

2.10.2 Hard Drive Installation

The hard drive must first be installed into a drive tray before the tray is installed into the ES chassis.

Step 1. ***Place the SCSI-320 hard drive into the drive tray*** (as shown in ***Figure 2- 3***) making sure that the hard drive is oriented in such a way that the single connector attachment (SCA) connector is facing the back of the drive tray.

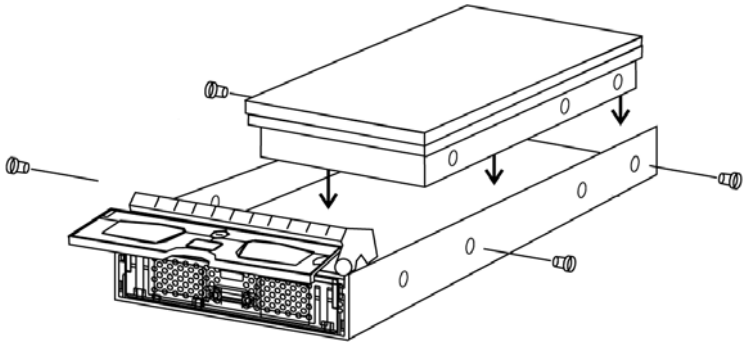

Figure 2- 3: Installing a SATA Hard Drive

Step 2. ***Adjust the drive's location*** until the mounting holes in the drive canister are aligned with those on the hard drive. Secure the drive with 4 supplied 6/32 flat-head screws. (See ***Figure 2- 3***)

WARNING:
Only use screws supplied with the drive canisters. Longer screws might damage the drive.

2.10.3 Drive Tray Installation

Once the hard drives have been installed in the drive trays, the drive trays must be installed into the ES subsystem.

Step 1. Make sure ***the key-lock is in the unlocked position***. The key-lock is unlocked if the groove (on its face) is in a horizontal orientation. If the groove is in a vertical position, as shown in ***Figure 2- 4*** then the key-lock is locked and the front flap on the drive tray cannot be opened.

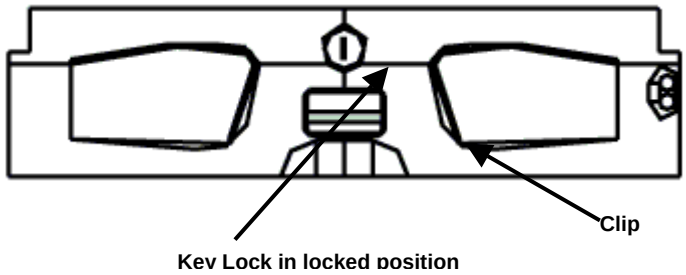

Figure 2- 4: Front view of an individual drive tray.

Step 2. ***Open the front flap on the drive tray*** (see ***Figure 2- 5***) To open the flap, push the clip (shown in ***Figure 2- 4***) on the front of the drive tray in an upward direction. The clip is easily accessible and is easily lifted.

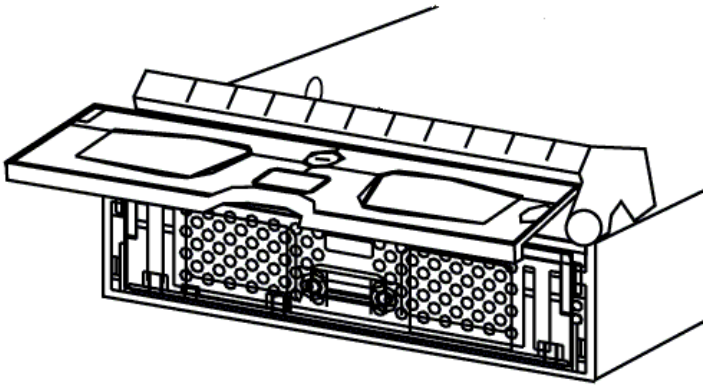

Figure 2- 5: Drive Tray Front Flap

Step 3. ***Line the drive tray up with the slot*** in which you wish to insert it. Make sure that it is resting on the rails inside the enclosure. Once the drive tray is lined up with the slot, gently slide it in. This should be done smoothly and gently.

Step 4. ***Close the front flap on the drive tray***. Make sure the front flap is closed properly. Closing the front flap ensures that the SCA connector at the back of the drive tray is firmly connected to the corresponding connector on the mid-plane board. If the front flap is not closed properly then the connection between the HDD and the subsystem will not be secure.

Step 5. To lock the flap into place turn the key-lock until the groove on its face is in a vertical orientation. (See ***Figure 2- 6***)

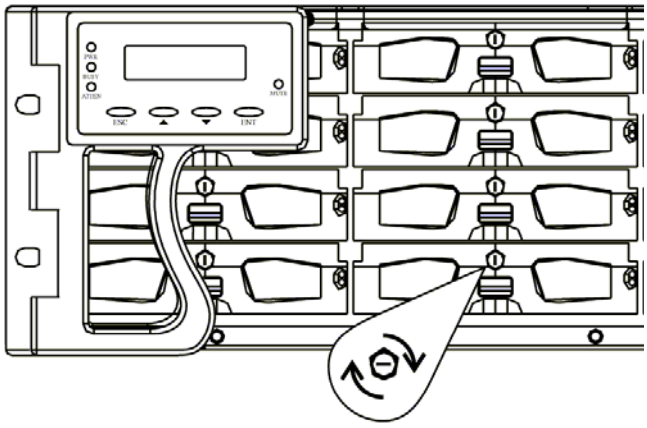

Figure 2- 6: Drive Tray Key-Lock Rotation

WARNING:
All the drive trays (even if they do not contain a hard drive) must be installed into the enclosure. If they are not installed into the enclosure then the ventilation required for cooling will not be normalized and the subsystem will be irreparably damaged.

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Chapter 3: Subsystem Monitoring

3.1. Chapter Overview

This chapter:-

1. Introduces the different ES subsystem monitoring techniques.
2. Gives detailed descriptions and definitions of status indicating LEDs
3. Describes the audible alarm and events that may cause it to trigger.
4. Introduces the ES subsystem I^2C monitoring.

After reading this chapter a user should:-

1. Be well acquainted with the different ES subsystem monitoring techniques.
2. Be able to use ES LEDs to determine the status of different subsystem components.
3. Know how to react when an audible alarm is heard.

3.2. Subsystem Monitoring Overview

The ES subsystem is equipped with a variety of self-monitoring features that help to keep subsystem managers informed of the subsystem operational status. These monitoring features provide vital feedback that helps users maintain the operational integrity of the subsystem. Prompt response to warnings and subsystem component failure notifications will improve the overall operation of the subsystem and help to ensure the longevity of the ES RAID subsystem.

Self-monitoring features include:-

- ***Management Firmware (FW)*** – The ES RAID subsystem controller comes with pre-installed FW (version 3.31 or above). The FW can be accessed using either the LCD panel or a PC hyper-terminal. The ES subsystem can be connected to a PC hyper-terminal through the RS-232C serial port. Device status information can be obtained from the FW. The FW has been fully described in the ***Generic User's Manual*** that came with the subsystem. Please refer to this manual for further details.

- ***RAIDWatch*** – RAIDWatch is a fully integrated Java based Graphics User Interface (GUI) (that came with the subsystem) and can be used to monitor the subsystem remotely. The powerful ***Notification Process Center*** (NPC) sub-module can be used to keep user's informed over a variety of communication devices like FAX, pager, e-mail etc. The installation and operation of RAIDWatch has been fully described in the ***RAIDWatch User's Manual***. Please refer to this manual for further details.

- ***LEDs*** – Device status indicating LEDs are placed on all the ES active components. These LEDs are used to inform users of the integrity of a given component or of a given SCSI-320 link. A user should familiarize themselves with the different LEDs that are present on the subsystem and be aware of their functions.

- ***Audible Alarm*** – An audible alarm is present on the subsystem controller board and will be triggered if any of a number of threatening events occur. These events usually jeopardize the functional and operational integrity of the controller board and must be heeded at all times. Events such as a breaching of the temperature threshold will trigger the alarm and if an onsite subsystem manager is present, the manager should, using either the LCD panel or the PC hyper-terminal, determine the cause of the alarm and take the appropriate corrective measures.

- ***I^2C –*** The I^2C bus is used to monitor the operational integrity of the Cooling FAN modules and the PSU modules of an external JBOD.

Subsystem monitoring is a necessary part of subsystem management. If failure events or other disruptive events are detected and reported, the subsystem managers must take the

appropriate action to rectify the problem. Failure to act in a properly specified manner to a system event (like overheating) can cause severe and permanent damage to the subsystem.

3.3. Status Indicating LEDs

3.3.1 Brief Overview of the LEDs

The following devices all come with LEDs that are used to inform subsystem managers about the operational status of the component on which they are mounted. The ES U16U has a total of 42 status indicating LEDs distributed over the active components in the following way.

- ***Controller Module*** – 3 LEDs used to indicate the status of different controller module components.
- ***PSU Modules*** – 1 LED each
- ***Cooling FAN modules*** – 1 LED each
- ***LCD Panel*** – 3 LEDs
- ***Drive Trays*** – 2 LEDs each

LED definitions are given in the following sections.

3.3.2 Controller Module LEDs

The rear panel of the controller module is shown in ***Figure 3-1*** below. The LED's are numbered from **1** – **3**. The definitions are shown in ***Table 3-1*** below.

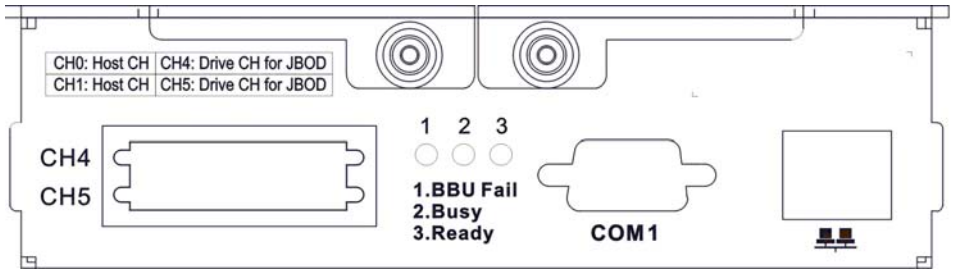


Figure 3-1: Controller Module Rear View

LED	Name	Color	Status
1	**BBU Fail**	Amber	**ON** indicates the BBU has failed and cannot sustain the cache memory. **FLASHING** indicates the BBU is charging. **OFF** indicates the BBU can sustain the cache memory. (***Note:*** If a BBU has not been installed then this LED will not function.)
2	**Busy**	Green	**ON** indicates there is activity **OFF** indicates that there is no activity
3	**Ready**	Green	**ON** indicates controller is active and operating properly. **OFF** indicates that the controller is not ready for operation.

Table 3-1: Controller module LED Definitions

3.3.3 LAN Port LEDs

The LAN port comes with two LEDs. As shown in ***Figure 3-2*** one LEDs indicates the "*Online Status*" and the other "*LAN Activity.*" The LED definitions are shown in ***Table 3-2***.

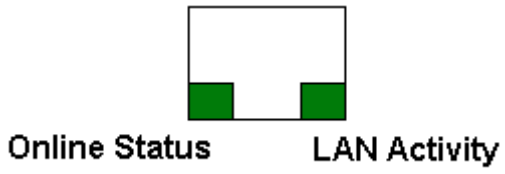


Figure 3-2: LAN Port LEDs

LED Name	Color	Status
Online Status	Green	On indicates currently connected to LAN
LAN activity	Green	Blinking indicates active transmission

Table 3-2: LAN Connector LED Definitions

3.3.4 PSU Module LED

The PSU module has a single LED located just above the power switch and just below the retention screw (see ***Figure 3-3***). The LED is used to indicate the operational status of the PSU module. Please refer to for the PSU LED definitions shown in ***Table 3-3***.

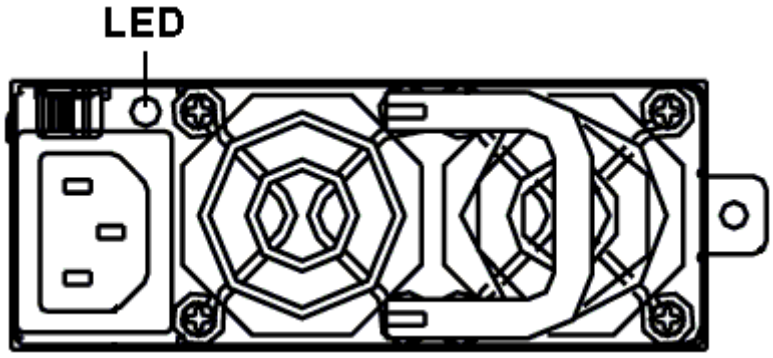


Figure 3-3: PSU Module Rear LED

Color	Status
Static Green	The PSU is operating normally and experiencing no problems
Static Red	The PSU has failed and is unable to continue providing power to the subsystem.
OFF	The power supply has not been turned on. The PSU module LED will remain off even if the power cable has been plugged in but the power switch not turned on.

Table 3-3: PSU module LED definitions

3.3.5 Cooling FAN Module LED

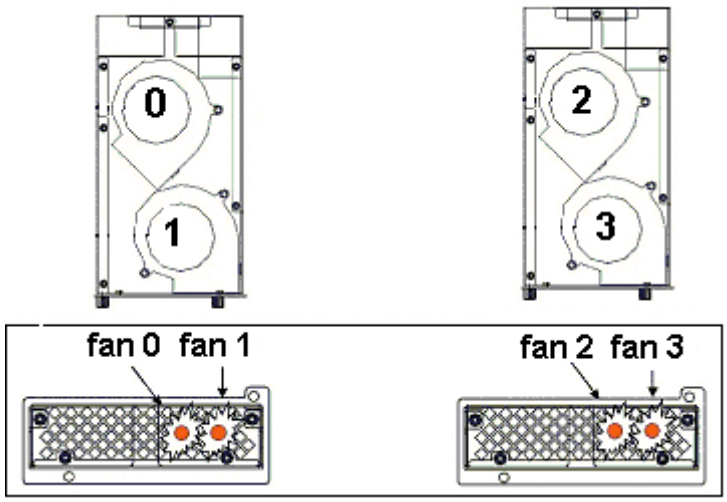


Figure 3-4: Cooling FAN Module LEDs and cooling FAN locations

The cooling FAN modules each have two red LEDs on the back. Each LED corresponds to a single fan in the cooling FAN module (see ***Figure 3-4***). When the LED is **ON** it indicates that the fan has failed. When the LED is **OFF** it indicates that the fan is functioning properly.

RED	Status
OFF	The respective cooling FAN is operating without any difficulties.
ON	The respective cooling FAN has failed and the module must be replaced.

Table 3-4: Cooling FAN module LED definitions

3.3.6 LCD Panel

The front panel LCD panel comes with three status, indicating LEDs. The LEDs on the front panel are marked, from top to bottom "**PWR**", "**BUSY**" and "**ATTEN**" and are clearly seen in ***Figure 3-5*** below. The definitions of these LEDs are shown in ***Table 3-1***.

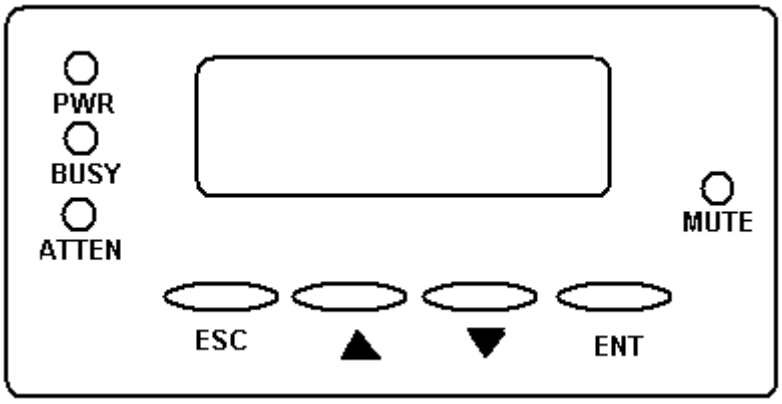


Figure 3-5: LCD Panel LEDs

LED Name	Color	Status
PWR	**Blue**	**ON** indicates that the power is being supplied to the subsystem. **OFF** indicates that no power is being supplied to the subsystem.
BUSY	**White**	**ON** indicates that there is activity on the host/drive channels. **OFF** indicates that there is no activity on the host/drive channels.
ATTEN	**Red**	**ON** indicates that a component failure/status event has occurred. **OFF** indicates that the subsystem and all the subsystem components are operating correctly.

Table 3-5: LCD Panel definitions

3.3.7 Drive Tray LEDs

The drive trays come with two status indicating LEDs. One indicates power and the other hard drive activity. The LEDs are shown in ***Figure 3-6*** and their definitions in ***Table 3-1***.

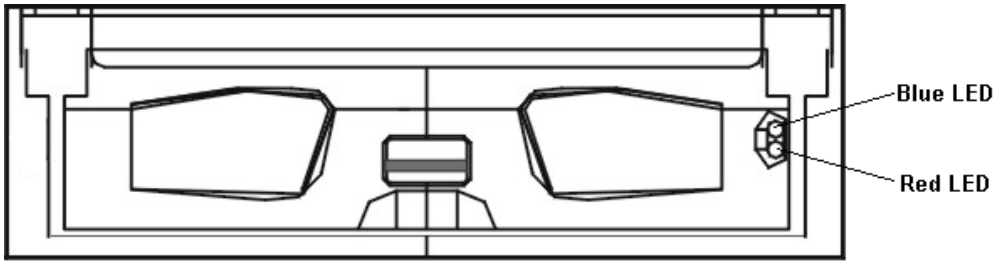


Figure 3-6: Drive Tray LEDs

LED Name	Color	Status
Drive Busy	**Blue**	**ON** indicates that the drive is ready **OFF** indicates that there is a problem with the drive.
Power Status	**Red**	**ON** indicates that there is no power being supplied to the drive

Table 3-6: Drive Tray LED Definitions for Single controller models

3.4. RAIDWatch Manager

The RAIDWatch Manager enables users to manage and maintain the RAID Controllers using their web browsers. The Ethernet port at the back of each controller module enable users to use a LAN cable to connect to the subsystem.

The RAIDWatch Panel View is a specialized customization that shows a direct representation of the ES U16U in the content panel of the RAIDWatch screen. The Panel View allows users to quickly determine the operational status of critical ES U16U components. Please refer to the RAIDWatch manual for further details.

NOTE: *The RAIDWatch User's Manual can be found on the CD-ROM that came with the system. To access the RAIDWatch User's Manual please refer to this file.*

3.5. Notification Processing Center (NPC)

The NPC is a powerful module that runs as a background ***Disk and Executive Monitor*** (DAEMON) independent from RAIDWatch that can, itself, be installed redundantly on different hosts. It is used for event notification over Email, LAN broadcast, and SNMP traps. It helps to prevent blind time and keeps a user constantly informed as to the status of the storage management subsystem. The NPC functionality can be activated and the instructions are given in the ***RAIDWatch User's Manual***.

NOTE: *The RAIDWatch User's Manual can be found on the CD-ROM that came with the system. To access the RAIDWatch User's Manual please refer to this file.*

3.6. Audible Alarm

Different controller environmental and operational parameters (like temperature etc.) have been assigned a range of values between which they can fluctuate. If either the upper or lower thresholds are exceeded, an audible alarm will automatically be triggered. The alarm will also be triggered when an active component of the ES U16U subsystem fails. If the ES U16U subsystem manager is onsite and is alerted by the alarm, to determine what has triggered the alarm the user will have to read the error message on the LCD screen or on the PC terminal. After determining what has occurred the ES U16U subsystem manager must take appropriate actions to rectify the problem.

WARNING:
If an alarm is triggered it is necessary for the user to determine the problem. If the audible alarm is ignored or not taken seriously and the problem is not rectified, permanent damage to the system can result.

3.6.1 Default Threshold Values

Table 3-7 shows the default threshold values for the ES subsystem. If any of these values are surpassed the alarm will sound:

Parameter	*Upper Threshold*	*Lower Threshold*
+3.3V	+3.6V	+2.9V
+5V	+5.5V	+4.5V
+12V	+13.2V	+10.8V
CPU Temperature	90ºC	0ºC
Board Temperature	90ºC	0ºC

Table 3-7: Default Threshold Values

The thresholds in ***Table 3-7*** are the default threshold values. The user can change these values. To see how to change these values please refer to the ***Generic Operation Manual*** that came with your system.

3.6.2 Failed Devices

If any of the following devices fail the audible alarm will be triggered.

- RAID Controller Modules
- Cooling Fan Modules
- PSU Modules
- BBU Modules
- Hard Drives

3.7. I^{2}C Port (Enclosure Monitoring)

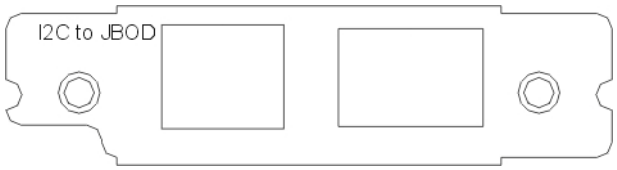


Figure 3-7: I^{2}C Port

The component status of an expansion enclosure is reported through an I^{2}C serial bus. This serial bus is connected to a RAID system over the enclosure's I^{2}C port using the included I^{2}C cable.

Corresponding to the redundant power supplies, there are two power switches on EonStor enclosures. The I^2C connector is located near the power switch on the upper left corner of enclosure rear panel.

Once connected, the RAID system will automatically poll the serial bus for component status, including that of the temperature sensors, cooling fans, power supplies, and slot status. No user's configuration is required.

Chapter 4: Subsystem Connection and Operation

4.1 Chapter Overview

This chapter:-

1. Describes how to operate the ES subsystem.
2. Describes how to connect the ES subsystem to external devices.
3. Briefly introduces FC topologies, SFP connectors, lasers etc.
4. Shows how to integrate an ES subsystem into a network.
5. Fully describes the power off and power on procedure.

After reading this chapter a user should:-

1. Know how to operate the ES subsystem.
2. Integrate the ES subsystem into a network.
3. Correctly power on and power off the subsystem.

4.2 EonStor U16U Subsystem Host Connection

4.2.1 SCSI Cables

One SCSI cable (IFT-9270UHstCab) is provided with the ES U16U for host connection. If a user wishes to use a second SCSI cable to connect the second host channel, a second cable must be purchased independently. When purchasing SCSI-320 cables ensure that they are of the highest quality and that a reputable manufacturer has produced them. To ensure optimum ES U16U performance it is necessary to use proper SCSI-320, high quality, durable SCSI cables. Failure to do so will result in downgraded performance.

4.2.2 Connecting the four channel ES U16U

The ES U16U RAID subsystem has two SCSI-320 connectors at the back of the controller module. These connectors serve as interfaces to CH0 and CH1 and allow the subsystem to be connected to external host computers. CH0 and CH1 can either be connected to the same host computer (see ***Figure 4-1***) or two different host computers (see ***Figure 4-2***).

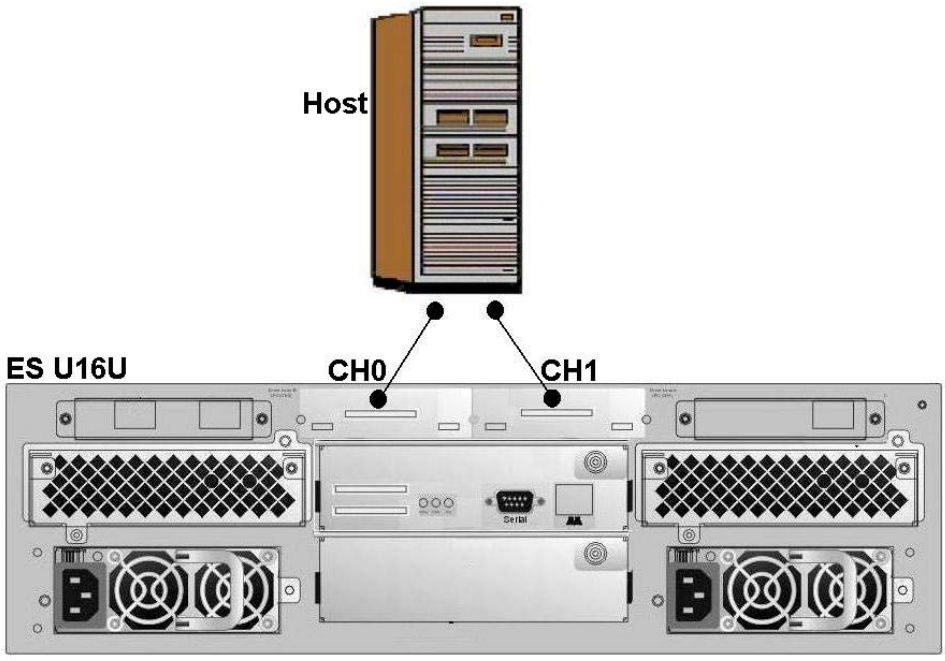


Figure 4-1: Single host Connection

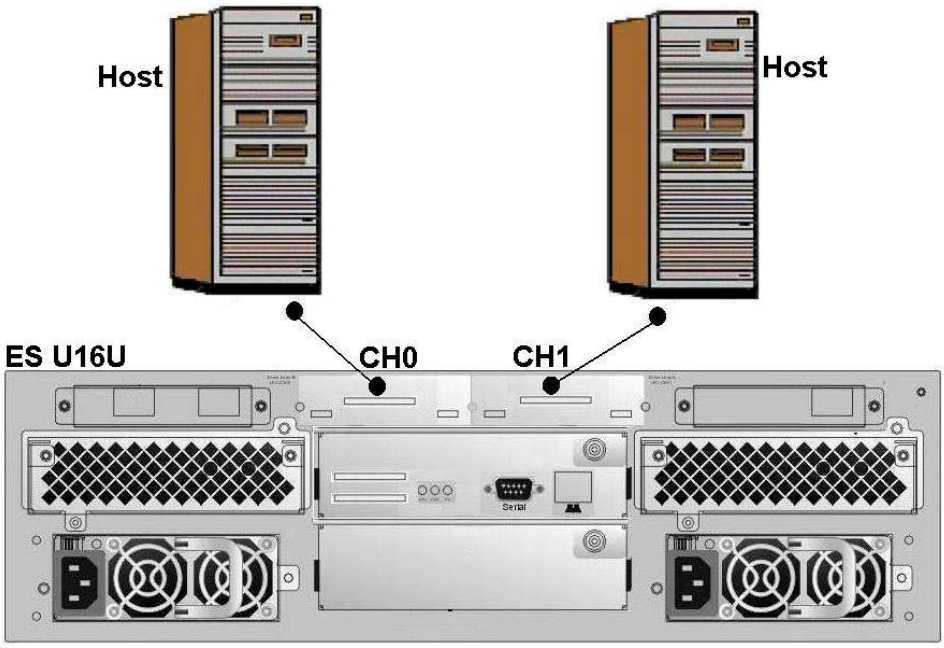


Figure 4-2: Dual host Connection

4.2.3 Operation Considerations

NOTE: *To create dual redundant data paths on the host side, it is necessary for third party failover software to be installed on the host computer/s.*

- Redundant Host Paths - In the two topologies shown above (see Figure 4-1 and Figure 4-2), if either of the host channel fails, the alternate host channel will continue to transmit data between the host computer/s and the ES U16U. That is, if CH0 fails, all traffic will be transmitted through CH1 and vice versa.

- Redundant Host Computers – In Figure 4-2 if either of the host computers fail data is still accessible through the second host computer. That is, if the host computer connected to CH1 fails, the data can still flow through the host computer connected to CH0 and vice versa. If in Figure 4-1 the host computer fails, data that is stored on the ES U16U hard drives will not be accessible until host computer functionality is restored.

4.2.4 Expansion

Two SCSI ports on the six channel models (ES U16UG4010-62-0030 and ES U16UG4010-65-0030) can be used for capacity expansion to cascade a RAID system with a JBOD. Connect the SCSI ports on the controller box's face plate (marked as CH4 and CH5) to ports on a JBOD. No termination setting is necessary, and there is no limitation as to which expansion port should be connected with which port on a JBOD. To be able to monitor the status of different JBOD components it is necessary to use a JBOD that can be connected to the I^2C port on the ES U16U subsystem. See ***Figure 4-3***.

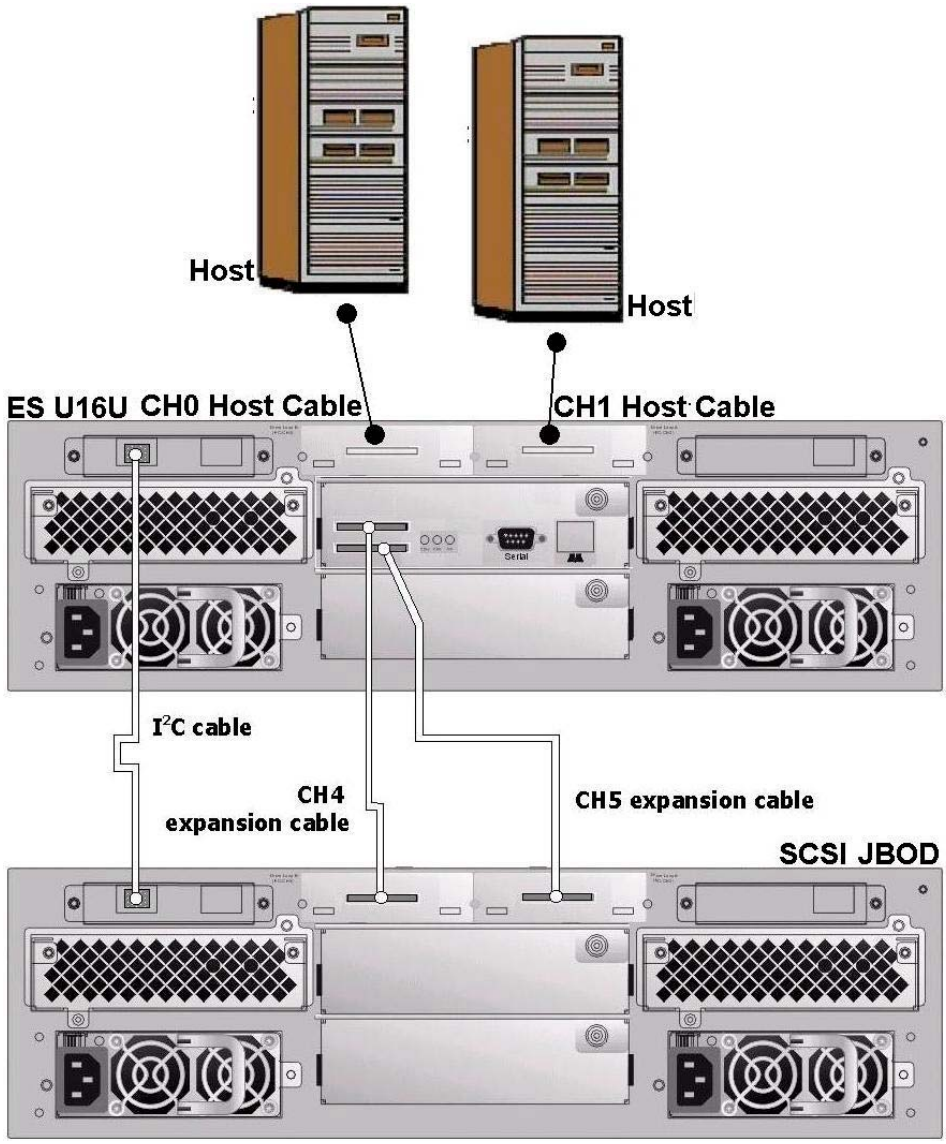


Figure 4-3: Subsystem Expansion

4.3 Power On

Once all the components have been installed in the EonStor subsystem and the host channels have been connected to the host and the expansion cables have been connected to the JBODs, the subsystem can be powered on.

4.3.1 Check List

BEFORE powering on the ES U16U subsystem, please check the following:

- ☐ ***Memory Modules –*** If new memory modules were installed, make sure that they have been correctly installed on the controller boards.
- ☐ ***BBU Modules*** –If installed, make sure the BBU Modules and the battery charger board have been installed correctly.
- ☐ ***Hard Drives –*** Hard Drives have been correctly installed on the drive trays.
- ☐ ***Drive Trays*** – **ALL** the drive trays, whether or not they have a hard drive, have been installed into the subsystem.
- ☐ ***Cable Connections –*** The host ports on the subsystem have been correctly connected to a host computer.
- ☐ ***Power Cables –*** The power cables have been connected to the PSU modules on the subsystem and plugged into the mains.
- ☐ ***Ambient Temperature*** – All the subsystem components have been acclimated to the surrounding temperature.

4.3.2 Power On Sequence

When powering on the ES U16U subsystem, please follow these steps.

1. ***Power on external storage devices***

   If a six channel ES U16U subsystem has been connected to an external SCSI-320 storage device as shown in ***Figure 4-3***, the external storage device should be powered on first.

2. ***Power on the EonStor subsystem***

   The ES U16U should be powered on before the host computers. The power on procedure for the ES U16U subsystem is described below.

3. ***Host Computers***

   The host computers should be the last devices that are turned on. Please refer to the manual that came with your host computers to see its own power on procedure

4.3.3 EonStor Power On-Procedure

To power on the subsystem, turn the two power switches, on the rear panel of the subsystem (see ***Figure 4- 1***). The power switches are located directly above the cooling FAN modules. Each switch controls a single PSU, therefore make sure that both switches are turned on.

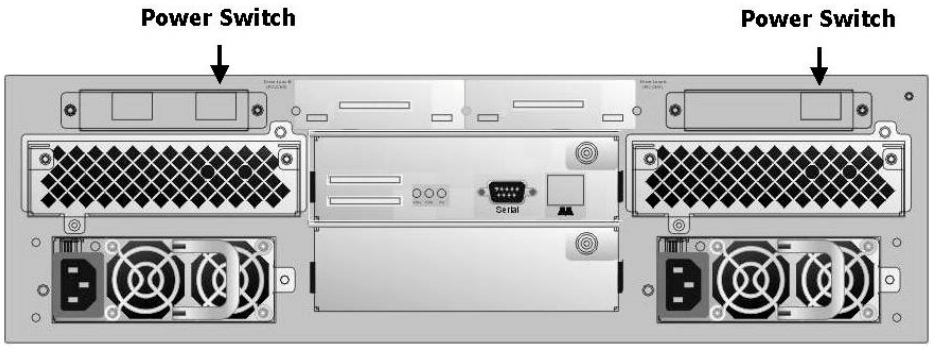


Figure 4- 1: EonStor Subsystem Power Switches

CAUTION:
Although the PSUs are redundant and a single PSU can provide sufficient power to the system, it is advisable to turn both the power switches on. If only one PSU is operating and fails, the whole system will crash.

4.3.4 Power On Status Check

Once the EonStor subsystem has been powered on, the status of the entire subsystem should be checked to ensure that everything is running smoothly and that there are no complications or malfunctions.

1. ***Controller Module LEDs*** – The controller module LEDs should all flash green.

2. ***Drive Tray LEDs –*** The Red LED for all the drive trays (that contain hard drives) should light up showing that there is power.

3. ***LCD Panel LEDs –*** The blue LED on the LCD panel should come on indicating that power is being supplied to the system.

4. ***Firmware and RAIDWatch*** – The overall status of the system may be checked using the pre-installed firmware or the RAIDWatch GUI.

5. ***Audible Alarm*** - If any errors should occur during the initialization process, the onboard alarm should be sounded in a hastily repeated manner.

Drive tray LEDs should normally start flashing, indicating the RAID control units are attempting to access the hard drives.

System firmware supports configuration of a delayed sequence for starting drives. Please consult your Generic Operation Manual for more details.

NOTE:
The subsystem has been designed to run continuously. Even if a component failure occurs the fault can be corrected online.

4.3.5 LCD Screen

When Powering On the subsystem the following messages should appear on the front panel LCD screen. Wait for the front panel LCD to show "**READY**" or "**No Host LUN**" before the host boots up. Refer to ***Figure 4- 2*** on how to read the screens.

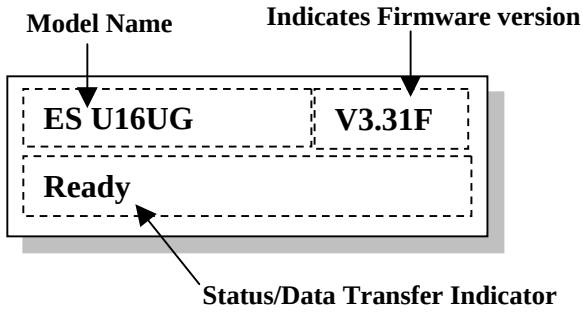
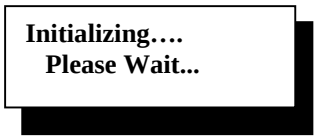
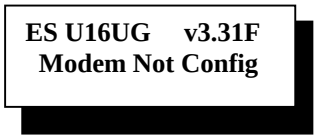


Figure 4- 2: The LCD Start-Up Screen

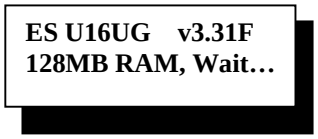
The LCD screen startup sequence is shown and described in the sequence below.

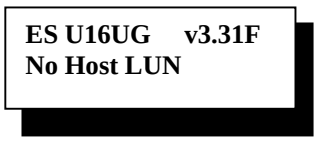


This screen appears when the PSUs are turned on.



This screen appears after the initialization process. It clearly shows the model name.





System is ready. You can now start to configure the subsystem.

4.4 Power Off Procedure

If you wish to power down the EonStor subsystem, please follow these steps:

NOTE:

If you wish to power down the EonStor subsystem, please ensure that no time-consuming processes, like a "logical drive parity" check or a "background scrub," are running.

1. ***Stop IO access to the system***

   Use the software that is provided on the host computer to stop all IO accesses to the EonStor subsystem. Please refer to the user manual that came with your host computer.

2. ***Disconnect the host***

   The host must be disconnected from the subsystem. To do this, disconnect the cables from both the host and the EonStor subsystem.

3. ***Flush the cache***

   Use the "Shutdown Controller" function to flush all cached data. This prepares the RAID subsystem to be powered down.

4. ***Turn off the power***

   Turn off the power switches at the top of the rear panel of the EonStor RAID subsystem. Once the RAID subsystem has been powered down, other devices that are connected to the subsystem may be powered down.

Chapter 5: Subsystem Maintenance

5.1. Chapter Overview

This chapter:-

1. Introduces how to maintain an ES subsystem.
2. Describes how to maintain the controller module.
3. Describes how to hotswap the active components in the subsystem.

After reading this chapter a user should:-

1. Be able to effectively and efficiently maintain their subsystem.
2. Replace active components when they fail.
3. Upgrade a single-upgradable model to a dual redundant model.

5.2. Overview

5.2.1 About Subsystem Maintenance

Constant monitoring and maintenance of your ES U16U subsystem will minimize the chance of system downtime and preserve the working integrity of the system for a longer period of time. If any of the subsystem plug-in modules fails, they must be replaced as soon as possible.

WARNING:

Do not remove a failed component from the subsystem until you have a replacement on hand. If you remove a failed component without replacing it the internal airflow will be disrupted and the system will overheat causing damage to the subsystem.

All the following components can be replaced in case of failure:

1. Controller Modules
2. PSU Modules
3. Cooling Fan Modules
4. Hard Drives
5. Hard Drive trays

5.2.2 General Notes on Component Replacement

- With the exception of the RAID controller module, all the components on the ES subsystem, including the PSU modules, cooling FAN modules, and drive trays are hot-swappable and can be changed while the subsystem is still in operation.
- Qualified engineers who are familiar with the ES subsystem should be the only ones who make component replacements. If a user is not familiar with the ES subsystem and not familiar with RAID subsystem maintenance in general, it is strongly advised that they refer ES subsystem maintenance to a suitably qualified maintenance engineer.
- Normalized airflow is directly dependent upon the presence of all subsystem components. A subsystem component, even if failed, should not be removed from the subsystem until a replacement is readily at hand and can be quickly installed. Removing subsystem components without a replacement can lead to permanent subsystem damage.

- When replacing any hot-swappable component, caution should be taken to ensure that the components are handled in an appropriate manner. The manhandling of components can lead to irreparable damage.

- When removing a controller module from the subsystem, ensure that the power has been turned off and that all precautionary measures, without exception, are adhered to. The controller board and the IO board on which it is mounted very sensitive components and can be easily damaged.

5.3. Controller Module Maintenance

5.3.1 Overview

The controller module consists of the components shown in ***Table 5-1***:

Component	User Serviceable (Y/N)	Maintenance Procedures
DIMM Module	Yes	The DIMM module must be replaced when either a DIMM module with a larger capacity is required or the DIMM module fails.
BBU Module with BBU charger board *(Optional)*	Yes	The BBU can be installed after the initial installation procedure or replaced if a previously installed BBU module is damaged and fails.
IO Board	No	N/A
Controller Board	No	N/A

Table 5-1: Controller Module Components

5.3.2 Notes on Controller Module Maintenance

- The controller module contains a DIMM module and may contain an optional BBU. When replacing the controller module, if these components are undamaged they must be removed from the old controller module and reinstalled onto the new controller module.

- When replacing the controller module, it should be remembered at all times that the controller board is one of the most sensitive components in the ES subsystem. All previously stipulated safety precautions (see ***Chapter 2***) must be strictly adhered to. Failure to adhere to these precautions can result in permanent damage to the controller board, resulting in timely delays for the end user. The same rule applies for the IO board that is mounted on the base of controller module chassis.

- Prior to replacing the controller module it is imperative for your own safety and that of the subsystem that no power is being supplied to the system.

5.3.3 Replacing a Failed Controller Module

A controller module can fail for a variety of reasons: either the controller board has sustained serious damage or the host IO board has been damaged in some severe way. In either instance it is necessary for the user to replace the entire controller module. To replace a failed controller module please follow these steps:

If a controller module has been damaged but the optional BBU (if installed), the BBU charger board and the DIMM module have not incurred any damage, they may be reused in the new controller module.

For instructions on how to replace a controller module, please follow these steps:

Step 1. ***Turn the subsystem power off*** – If the controller module has failed, it is necessary to turn the power off. To do this, flip the power switches on both PSU modules to an off position.

Step 2. ***Disconnect all the Cables*** – There may be a number of different cables attached to the controller module. These cables could include SCSI cables for host connection, RS-232C cable for serial port connection and an Ethernet cable for LAN connection. Prior to removing the controller module all these cables should be removed.

Step 3. ***Loosen the retention screws*** - The controller module is secured to the enclosure with a two, hand retention screws. Loosen these screws by turning them in an anti clockwise direction. (See ***Figure 5-1***)

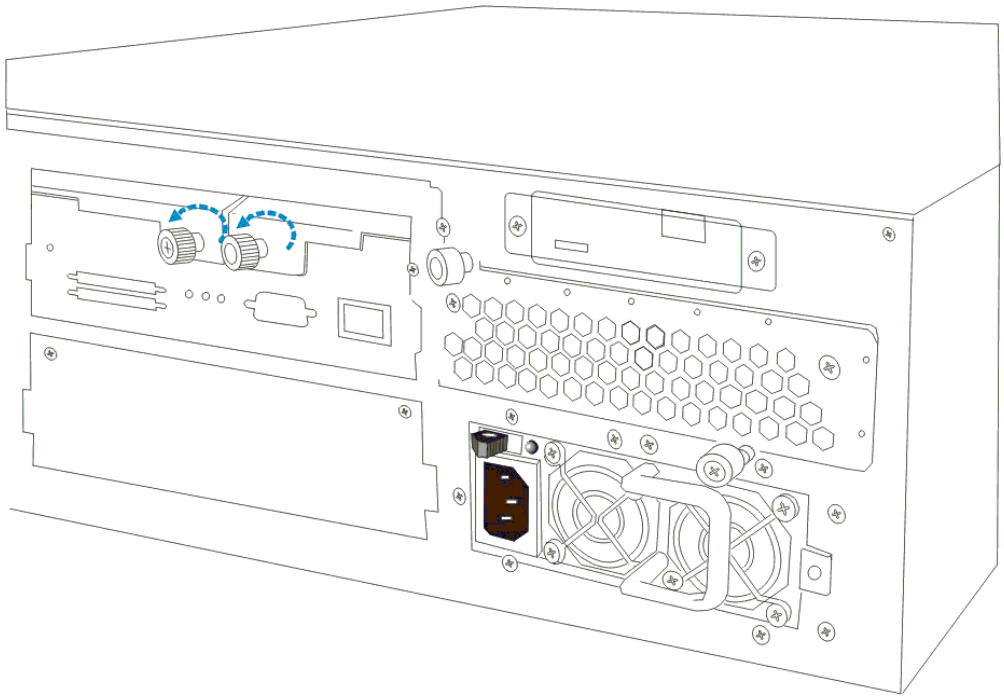


Figure 5-1: Loosen Controller Module Retention Screws

Step 4. ***Pull the Controller module Out*** – Once the retention screw have been loosened, open the rear flap and gently pull the controller module out of the ES U16U chassis.

Step 5. ***Remove the (optional) BBU*** – If a BBU has been previously installed on the controller module, remove both the BBU and the battery charger board. For further details please refer to ***Section 5.3.4***.

Step 6. ***Remove the DIMM Module*** – If the currently installed DIMM module will be used on the new controller board then it must be removed from the board that is being discarded. For further details please refer to ***Section 5.3.5***.

Step 7. ***Reinstall the DIMM Module*** – Install the DIMM module into the new controller module. For further details please refer to ***Section 5.3.5***.

Step 8. ***Reinstall the BBU and Charger Board*** – If an optional BBU with a charger board was previously stored in the old controller module, reinstall both the BBU and the charger board in the new controller module now. For further details please refer to ***Section 5.3.4***.

Step 9. ***Install the new controller module*** – Once the DIMM module and the optional BBU has been installed in to the controller module, insert the new controller module into the controller bay at the rear of the subsystem. Once the controller module has been completely inserted into the ES U16U enclosure, secure the controller module to the enclosure by tightening the hand screws at the top of the controller rear panel.

Step 10. ***Connect the Controller Module Cables*** – Connect all of the cables that were previously disconnected from the controller module. These may include SCSI cables for host connection, RS-232C cable for serial port connection and an Ethernet cable for LAN connection.

Step 11. ***Power On*** – Once the new controller module has been properly installed and the cables have been correctly connected. Power Up the subsystem.

5.3.4 BBU and BBU Charger Board Replacement

If an optional BBU was installed with the charger board and either or both of these components fail, they must be replaced.

NOTE: *When replacing a BBU, the whole subsystem needs to be powered down therefore, when replacing a failed BBU a user should carefully select the time at which the replacement is made to minimize the overall disruption to the service.*

To replace a BBU module please follow these steps:

Step 1. ***Power Down the subsystem*** – Before replacing the BBU module, correctly power down the subsystem.

Step 2. ***Disconnect all the Cables*** – There may be a number of different cables attached to the controller module. These cables could include SCSI cables for host connection, RS-232C cable for serial port connection and an Ethernet cable for LAN connection. Prior to removing the controller module all these cables should be removed.

Step 3. ***Loosen the retention screw*** - The controller module is secured to the enclosure with a single retention screw. Loosen this screw and open the rear flap on the controller module. For more details see ***Section 5.3.3***.

Step 4. ***Pull the Controller module Out*** – Once the retention screw has been removed and the rear flap opened, gently pull the controller module out of the ES U16U chassis.

Step 5. ***Disconnect the BBU Connector*** – Disconnect the BBU connector from the battery charger board to which it is connected. See ***Figure 5-2***.

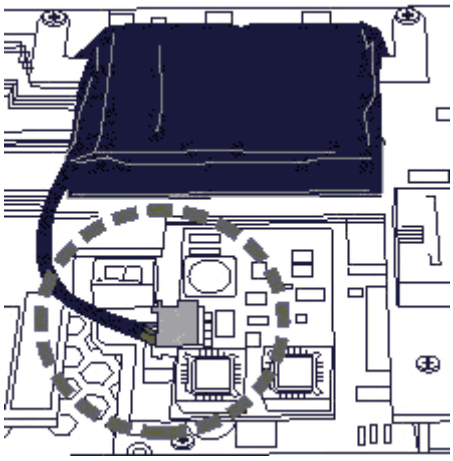


Figure 5-2: Disconnect the BBU Connector

Step 6. ***IF THE BBU FAILED Remove the retention screws –*** The bracket of BBU is attached to the IO board through two retention screws that pass through the bracket, IO board and spacers that connect the IO board to the controller board. Remove these screws.

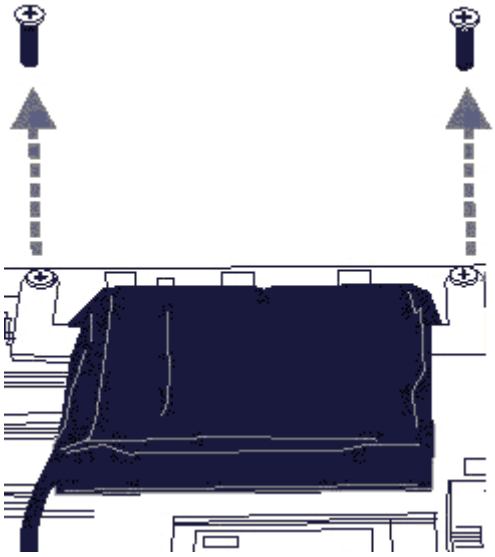


Figure 5-3: Remove BBU Retention Screws

Step 7. ***Insert retention screws –*** Line the brackets of the new BBU with the screw holes in the IO Board and re-insert the retention screws.

Step 8. ***IF THE BBU CHARGER BOARD FAILED –*** Remove the charger board from the controller board and replace it with a new charger board. To remove the BBU charger board, lift the charger board in an upward direction.

Step 9. ***Connect the BBU to the Charger board –*** Connect the BBU cable to the connector on the charger board.

Step 10. ***Install the controller module*** – Once new BBU has been installed in to the controller module, insert the controller module into the controller bay at the rear of the subsystem. Once the controller module has been completely inserted into the ES U16U enclosure, close the controller rear flap and tighten the hand retention screw.

Step 11. ***Connect the Controller Module Cables*** – Connect all of the cables that were previously disconnected from the controller module. These may include SCSI cables for host connection, RS-232C cable for serial port connection and an Ethernet cable for LAN connection.

Step 12. ***Power On*** – Once the new controller module has been properly installed and the cables have been correctly connected. Power Up the subsystem.

5.3.5 DIMM Module Replacement

If a DIMM module fails or a DIMM module with a higher memory capacity is required, the onboard DIMM module must be replaced.

- ***Failed DIMM module*** – If a DIMM module has failed, prior to removing the controller module both PSU modules must be turned off and all the cables connected to the controller must be disconnected.

- ***DIMM module replacement*** – If a DIMM module is going to be replaced, prior to removing the controller module make sure that the subsystem is correctly powered down and all the cables connected to the controller must be disconnected.

NOTE:
When replacing a DIMM, the whole subsystem needs to be powered down therefore, when replacing a DIMM a user should carefully select the time at which the replacement is made to minimize the overall disruption to the service.

- ***Replacing the DIMM Module*** – Complete illustrated instructions on how to replace a DIMM module have been given in ***Chapter 2***, please refer to ***Section 2.6***.

NOTE:
When replacing a DIMM, if a BBU and a BBU charger board have been installed, they both need to be removed first.

5.3.6 Controller Board and Host IO Board Maintenance

Both the controller board and the host IO board are not user serviceable. If either of these boards are damaged in any way the subsystem will not be able to run and the whole controller module will need to be replaced. When replacing a controller module, if the DIMM module and the optional BBU module (if installed) are undamaged, they must be

transferred from the old controller module to the replacement. Instructions for replacing a controller module have been given in ***Section 5.3.3*** above.

5.4. Replacing a Failed PSU Module

5.4.1 Notes on PSU Module Maintenance

- ***Two redundant PSU modules*** - The ES comes with two fully redundant, hot-swappable PSU modules. These modules are located at the rear of the subsystem.

- ***Immediate Replacement*** - When a PSU fails it should ideally be replaced immediately. Do not remove the PSU module unless a replacement is readily available. Removing a PSU without a replacement will cause severe disruptions to the internal airflow and the subsystem will over heat possibly causing irreparable damage to some of the subsystem components.

WARNING:

Although the PSU modules are fully redundant, it is not advisable to run the EonStor subsystem with a single PSU module for a long period of time. If the second PSU module fails the sub-system will be shut down..

5.4.2 Replacing the PSU Module

To replace a PSU please follow these steps:

1. ***Turn off the PSU***. The power switch is located at the top of the rear panel, directly above the PSU module. (See ***Figure 5-4***)

2. Once the power switch has been turned off, ***remove the power cable*** that connects the ES U16U subsystem to the mains. The power cable socket is found on the left-hand side.

3. After the power cable has been removed from the socket, ***remove the retention screw*** that is found on the right hand side of the PSU. (See ***Figure 5-4***.)

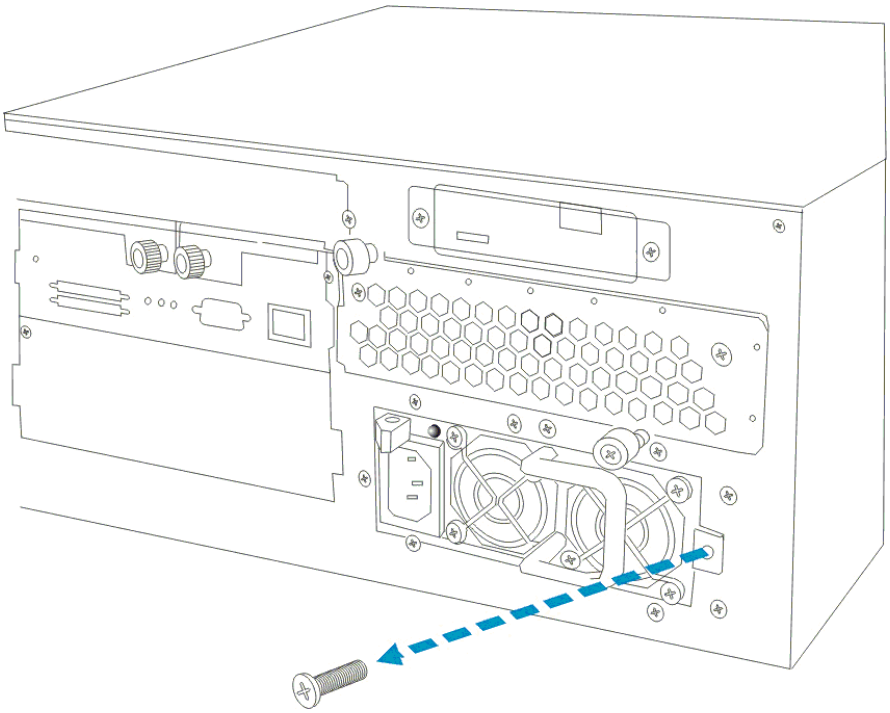


Figure 5-4: Removing the PSU Retention Screw

4. A clip can be seen at the top left-hand corner of the PSU. This clip is used to secure the PSU into the subsystem enclosure. To remove the PSU, ***push this clip towards the right***. (See ***Figure 5-5***).

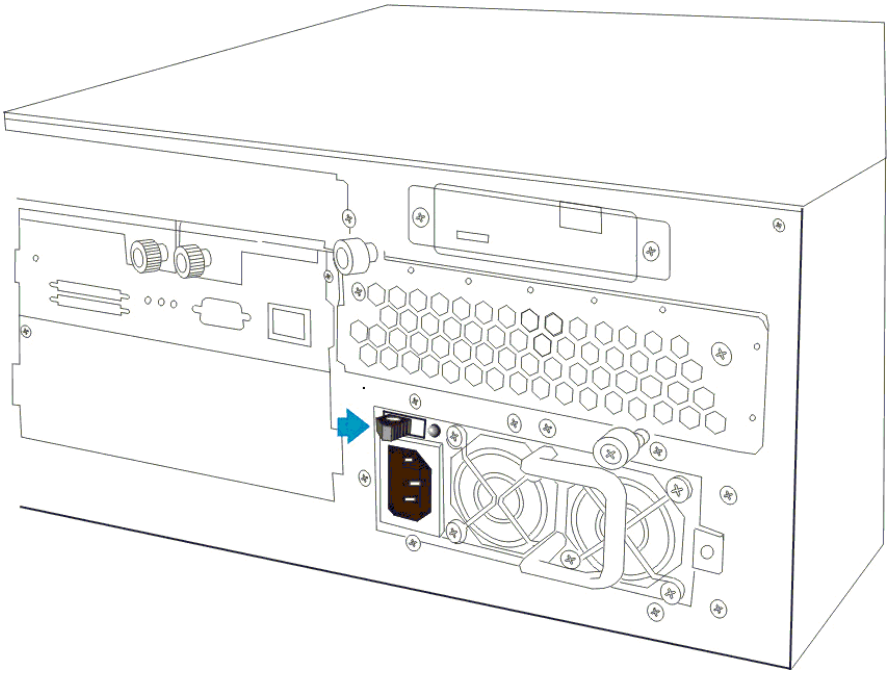


Figure 5-5: Dislodging the PSU

5. After the PSU module has been dislodged from the enclosure, use the handle at the rear of the PSU to ***gently pull the PSU module out of the enclosure***. (See ***Figure 5-6***)

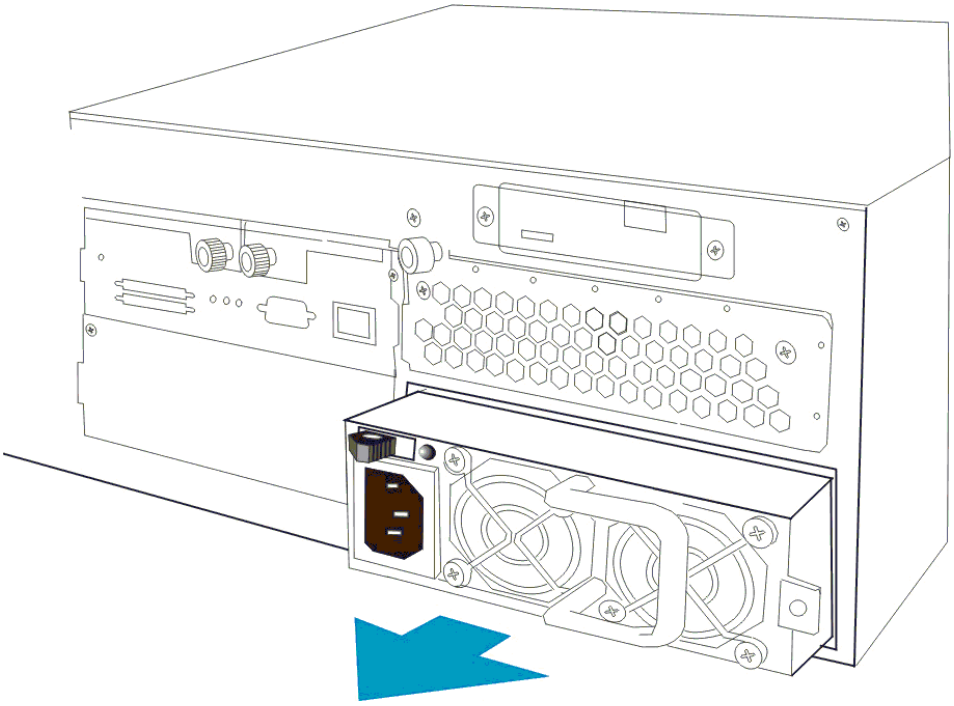


Figure 5-6: Removing the PSU from the subsystem

6. Once the faulty PSU has been removed, ***insert the new PSU module*** into the subsystem. Push the PSU into the slot until it clicks into place.

7. To firmly secure the PSUs into place, reinsert the retention screw.

8. Replace the power cable that is used to connect the PSU module to the mains.

9. Turn the PSU module on.

5.5. Cooling FAN Module Maintenance

5.5.1 Notes on Cooling FAN Module Maintenance

WARNING:
If the latches at the back of the cooling FAN module, which are used to secure the cooling FAN module into the enclosure, are broken, the warranty on the cooling FAN module will be void.

- ***Two Redundant Cooling FAN modules*** - The ES subsystem is equipped with two redundant, hot-swappable, dual-blower cooling FAN modules located above the PSU modules. These cooling FAN modules are responsible for controlling the internal operational temperature of the subsystem and therefore their working integrity should be maintained at all times.

- ***Detecting a failed cooling FAN Module*** - If a cooling FAN module fails either the LED located at the back of the module, an audible alarm, firmware, the RAIDWatch Panel View, or the NPC can be used to notify a user.

- ***Replacing a cooling FAN module*** - If a user becomes aware that a cooling FAN module has failed, it should be replaced as soon as possible. A failed cooling FAN module should only be removed from the subsystem when the user has an immediately available replacement module that can be installed as soon as the failed cooling FAN module has been removed.

WARNING:

Although the cooling FAN modules are fully redundant, it is not advisable to run the EonStor subsystem with a single cooling FAN module for a long period of time. If the second cooling FAN module fails the system is at risk of sustaining irreparable damage.

5.5.2 Replacing a Cooling FAN Module

To replace a cooling FAN module, please follow these instructions:

1. Two retention screws are used to secure the cooling FAN module to the EonStor subsystem. The first retention screw can be found at the top, on the right, and the second at the bottom on the left. ***Remove these retention screws***.

2. Once **BOTH** retention screws have been removed, gently pull the cooling fan module out of the EonStor subsystem enclosure. (See ***Figure 5-7***).

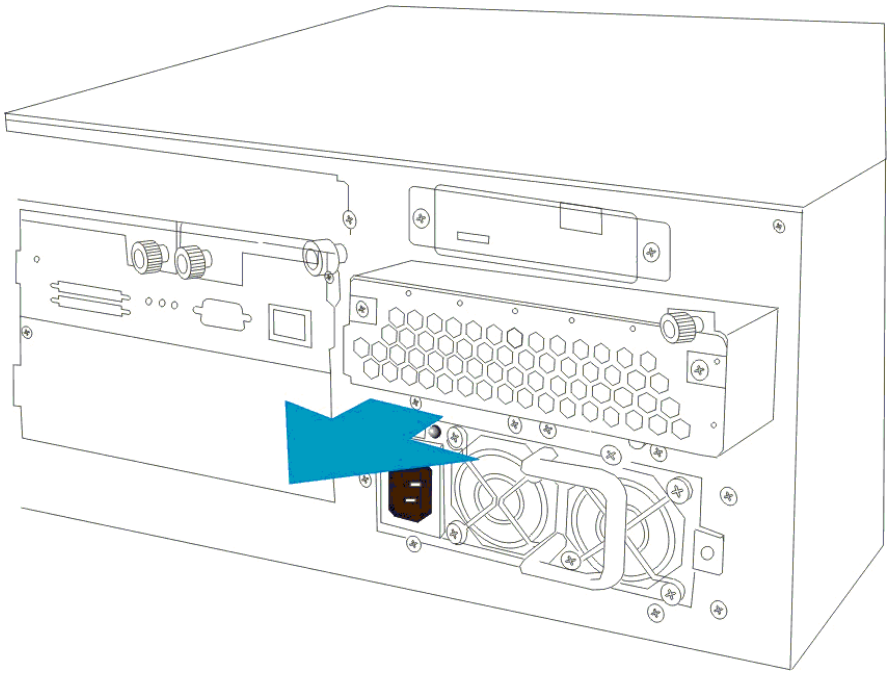


Figure 5-7: Removing the Cooling FAN Module

3. Once the damaged/broken cooling FAN module has been removed, gently slide the new cooling FAN module into the EonStor chassis.

4. Re-insert both the retention screws that were previously removed.

5.6. Drive Tray Maintenance

5.6.1 Notes on Hard Drive Maintenance

- ***Hot-swappable drive trays*** - The drive trays are all hot-swappable. If a hard drive fails it can be replaced while the subsystem is still running.

- ***Remove Drives Slowly*** - When removing a drive tray from the ES subsystem enclosure, it must not be removed too quickly. When removing a drive tray, withdraw it from the enclosure slowly. If the drive tray is removed too quickly a drive IO timeout will occur.

- ***Open Flap*** - Once the flap on the drive tray has been opened, the drive tray must be removed from the subsystem. Failure to remove the drive tray from the subsystem after the flap has been opened will result in Data Compare Errors.

- ***Replacement on hand*** - If a hard drive has failed, before removing it from the subsystem make sure you have a replacement hard drive readily available. Do not leave the drive tray slot open for an extended period of time. If the drive tray slot is left unoccupied for an extended period of time, the normalized airflow will be

disrupted and subsystem components will overheat and may be permanently damaged.

5.6.2 HDD Replacement

If one of the hard drives fails it needs to be replaced. To replace a hard-drive please follow these steps.

1. ***Remove the drive bay*** from the EonStor enclosure. To remove the drive bay from the enclosure, the key-lock must be unlocked. To do this, turn the silver key-lock on the front of the drive tray until the groove on its face is in a horizontal orientation.

2. Once the key-lock is unlocked ***open the front flap***. To open the front flap, lift up the clip at the front of the drive tray. This will dislodge the hard drive from the enclosure and the hard drive can be carefully withdrawn.

3. ***Remove the retention screws*** on the sides of the drive tray from the hard drive and then remove the hard-drive from the drive tray.

4. Install the new hard drive. Please refer to the complete hard drive installation procedure in Chapter 2.

Appendix A: EonStor U16U Features

A.1. Appendix Overview

This Appendix:-

1. Introduces the flexible configuration options of the ES U16U subsystems.
2. Introduces some of the Redundant Features.
3. Describes some of the fault tolerant features
4. Describes the mechanical features.

After reading this Appendix a user should:-

1. Have an overview of the configuration flexibility of the ES U16U subsystems.
2. Be acquainted with rich variety of features available to the ES U16U subsystems.

A.2. Overview

The ES U16U RAID Subsystem comes with many different features. Some of these features enhance the performance of the system, other features add configuration flexibility and other features simplify the installation, maintenance and upgrade procedures of the system. This section highlights some of the features of the ES RAID Subsystem.

A.3. Subsystem Features

A.3.1 Model Variations

The ES U16U RAID subsystem comes in a variety of models that enables users to carefully select a RAID subsystem that will meet their needs. Two models provides optional expansion ports for those users who require larger amounts of storage. A variation in DIMM module sizes also provides further selection flexibility.

A.3.2 SCSI-320 Host

The ES U16U controller modules have two SCSI-320 host channels. Both these channels can be connected to a SCSI-320 host computer with data transmission rates of up to 320MB/sec.

A.3.3 Sixteen SCSI-320 Drives

The ES U16U comes with sixteen drive trays that are able to accommodate a large variety of 16 hot-swappable SCSI-320 drives. These drives provide users with massive amounts of storage space.

A.3.4 Expansion channels

Two models come with two SCSI-320 expansion channels that are pre-configured as drive channels. This enables users to further expand their RAID storage by connecting the SCSI-320 expansion ports to an external SCSI-320 storage device.

A.3.5 Cableless Design

All of the active, user serviceable components are attached directly to the ES U16U and secured with easily accessible retention screws (*Note: Drive trays do not have retention screws*). None of these components have any cables attached to them. This facilitates simplified installation and maintenance procedures.

A.4. Fault Tolerance

A.4.1 Intelligent Drive Handling

Media Scan is an innovative Intelligent Drive Handling function that can be used for data retrieval from degraded or damaged hard drives. If two bad blocks occur on two member drives of an array, the integrity of the stored data will be endangered. Intelligent Drive Handling capabilities can be used to retrieve data from the damaged sectors. Media Scan is able to handle low quality drives in both the degraded mode and during the rebuild process. Other Intelligent Drive Handling features, which provide further data security, include the transparent resetting of hung hard drives, Power-failure management and bad drive handling during LD expansion.

A.4.2 Auto Switch Cache Policy and Auto Shutdown

When a RAID controller detects conditions that exceed the preset thresholds, the following actions will be initiated to protect the hardware:

1. Cached data will be automatically flushed and the array's caching mode will be switched from write-back to write-through

2. If the conditions persist for a preset period of time, auto shutdown of the controller will commence.

All the thresholds associated with this mechanism are user configurable and, once a subsystem manager restores the normal operating conditions, the caching mode will change back from the write-through mode to the write-back mode.

A.4.3 Global and Local Spares

Both Global and Local (dedicated) spares are supported. The controller(s) will automatically disconnect from a failed drive and start to rebuild data on the spare drive. The spare drive will then replace the failed drive.

A.4.4 Hot-Swapping of Drives

A failed drive in the EonStor subsystem can be exchanged without turning off the system or interrupting the smooth operation of the system. Once the failed drive is replaced the data will be rebuilt in the background. Hot-swapping is supported through the automatic disconnection from a failed drive and the detection of a reserve drive. All these failure recovery procedures are completely transparent to the host.

A.4.5 S.M.A.R.T. Support

S.M.A.R.T (Self Monitoring Analysis and Reporting Technology) is supported with configurable reaction schemes. Users may select different reaction schemes for immediate prevention against S.M.A.R.T. detected errors. Available options include:

detect only, clone and replace, and perpetual clone. A faulty drive can be cloned to an active spare upon the discovery of errors.

A.4.6 Other Fault Tolerant Features

Other comprehensive failure management features on the EonStor RAID Subsystem include:

- Automatic Bad Block Assignment
- Background rebuilding
- Verify-after-Write is supported on normal writes, rebuild writes and/or RAID initialization writes.
- Regeneration of parity of logical drives in the background.

Appendix B: Specifications

B.1. Appendix Overview

This Appendix provides:-

1. Technical Specifications
2. Controller Specifications
3. Drive Tray Specifications
4. Power Supply Specifications
5. RAID Management
6. Fault Tolerance Management

After reading this Appendix a user should:-

1. Be acquainted with the subsystem specifications

B.2. Technical Specifications

RAID Controller Module Specifications	
Main Processor	PowerPC 750CXe 400MHz with 256KB of internal L2 running at the processor's core speed
Host Channel Interface	Two SCSI-320 SCSI channels
Drive Interface	Support for Sixteen (16) SCSI-320 drives
RAID Controlling Unit	Architectural Features: • 133MHz Hardware XOR engine; 133MHz memory bus; dedicated for dual-PCI bandwidth. • 133MHz, ECC, 128MB to 1GB SDRAM DIMM memory support. • Optional Li-Ion battery module for up to 72 hours of backup time using a 512MB memory, 4MB onboard flash memory for controller firmware with a real time clock (noting controller event time of occurrence and for scheduling maintenance tasks by future firmware)
RAID Controller Interfaces	• VHDCI 0.8mm dual stack mini-SCSI connectors • RJ-45 Ethernet connector receptacle • RS-232C serial port • LCD keypad panel on the front foldable handle • Other signals routed through hot-pluggable FCI connectors to back-end PCBs
System Environmental Specifications	
Relative Humidity	5 ~ 95% (non condensing – operating and non-operating)
Temperature	*Operating*: 0º to 40ºC *Non-operating*: -40º to +65ºC
Thermal Cycle	*0 ~ +40*ºC (95% RH @ +40ºC), 12hrs/step, 10 cycles (Op) and –40 ~ +65ºC (95% RH @ +65ºC), 48hrs/step, 1cycle (Non-operating)
Altitude	*Operating*: 0 ~ 10,000 ft *Non-operating*: 0 ~ 40,000 ft

Power Requirements	
Input Voltage	90VAC @ 8AC 260VAC @ 4AC with PFC (auto-switching)
Frequency	47 – 63Hz
Power Capacity	460W

Dimensions	
Height	131 mm
Width	447 mm
Length	500 mm

EMI/EMC
• FCC Class-B • CE • UL

Shock	
Half-sine	*Operating:* 5G peak, 11ms duration, *Non-operating:* 15G, 11s, half-sine

Vibration	
Operating	5~500Hz, 0.2G, X/Y/Z
Non-operating	5~500Hz, 1G, X/Y/Z

Warning Alarms
• Audible Alarms, • System LEDs, • Local and remote Event notification via the RAIDWatch manager, manager screen, Event Monitor, terminal sessions and LCD screen events

B.3. RAID Operation Specifications

B.3.1 Configuration

Specification	
RAID Levels	0, 1(0 + 1), 3, 5, 10, 30, 50, JBOD, and Non-RAID disk spanning
Host O/S Compatibility	Host O/S Independent
Host Interface	SCSI-320
Host Channels	Pre-configured host channels
Drive Interface	Support 16 SCSI-320 drives
Drive Channels	All drive channels are pre-set and cannot be changed.
Cache Mode	Write-through or write-back; variable optimization parameters per array
Cache Memory	Up to 1GB SDRAM with/without ECC, non-registered
Number of LUNs	Up to 32 per host ID, a maximum up to 1024 depending on system configuration
Multiple Target ID's/host Channel	Yes
Aliases for target IDs	Yes
Firmware on Flash Memory	Yes
Drive Hot-swapping	Yes; w/ transparent reset of hung drives

B.4. Drive Tray Specifications

Specification	
Tray Pitch	27.6mm
Tray Width	< 110mm
Tray Carrier Depth	180mm
Tray Plastic Depth	30mm
Total Depth	210mm (= 180mm + 30mm)
Key Lock	Yes

B.5. Power Supply Specifications

Specification	
Dimension	265mm (D) x 107mm (W) x 42.2mm (H)
Nominal Power	460W
DC output	**12.0V:** 32A – 38A (peak) **5.0V:** 25A **3.3V:** 20A

Input Frequency	47 ~ 63Hz
AC Input	90VAC @ 8AC – 260VAC @ 4AC with PFC
Power factor correction	Yes
Hold-up time	At least 16ms at 115/230VAC full load after a loss of AC input
I^2C	Through backplane to controller
Over temperature protection	Lost cooling or excessive ambient temperature
Cooling Fans	Two fans for each unit (inside PSU)

B.6. RAID Management

Specification	
Performance Monitoring	Yes
Remote control and monitoring	Yes
Event Broadcast/Alert	Yes (via Java-based RAIDWatch manager and Event Monitor)
Event Notification	Yes (Via RAIDWatch's sub-module, NPC)
Hardware Connection	In-band over SCSI, Ethernet, or RS-232C
Configuration on Disk	Configuration Data stored on disks for logical drive assemblies to exist after controller replacement.
Failure Indicator	Via Alarm, LCD Panel, RAIDWatch Manager, or terminal emulation.

B.7. Fault Tolerance Management

Specification	
Drive S.M.A.R.T Support	Yes (with user-configurable detect only, clone and replace and perpetual clone functions).
Battery Back-up option	Yes
ISEMS (Infortrend Simple Enclosure Management Service) via I^2C interface	Yes
Automatic Drive Failure Detection	Yes
Automatic rebuild on spare drives	Yes
Regenerate Logical drive parity	Yes
Bad block re-assignment	Yes
Automatic rebuild upon failed drive replacement	Yes
Manual Clone of suspected failed drive	Yes
Concurrent Rebuild on Multiple drive in a RAID (0 + 1) logical	Yes

drive	
Salvage the 2nd temporary failed drive in a RAID 1, 3 or 5 logical drive	Yes
Salvage the 1st temporary failed drive in a RAID 0 logical drive	Yes

Appendix C: Packaging

C.1. Appendix Overview

This Appendix:-

1. Describes the subsystem packaging.
2. Lists components that can be found in the contrainer.

After reading this Appendix a user should:-

1. Be able to check that all the components arrived with the subsystem.

C.2. Overview

The EonStor subsystem is packed in 7 boxes as shown ***Figure C-1***. Six boxes are, as seen in ***Figure C-1***, placed in a single container box. The subsystem chassis is placed right at the bottom of the box. Two boxes containing HDD trays and two boxes containing controller modules are placed directly above the chassis. A box containing the accessory items are placed above the boxes with the controllers.

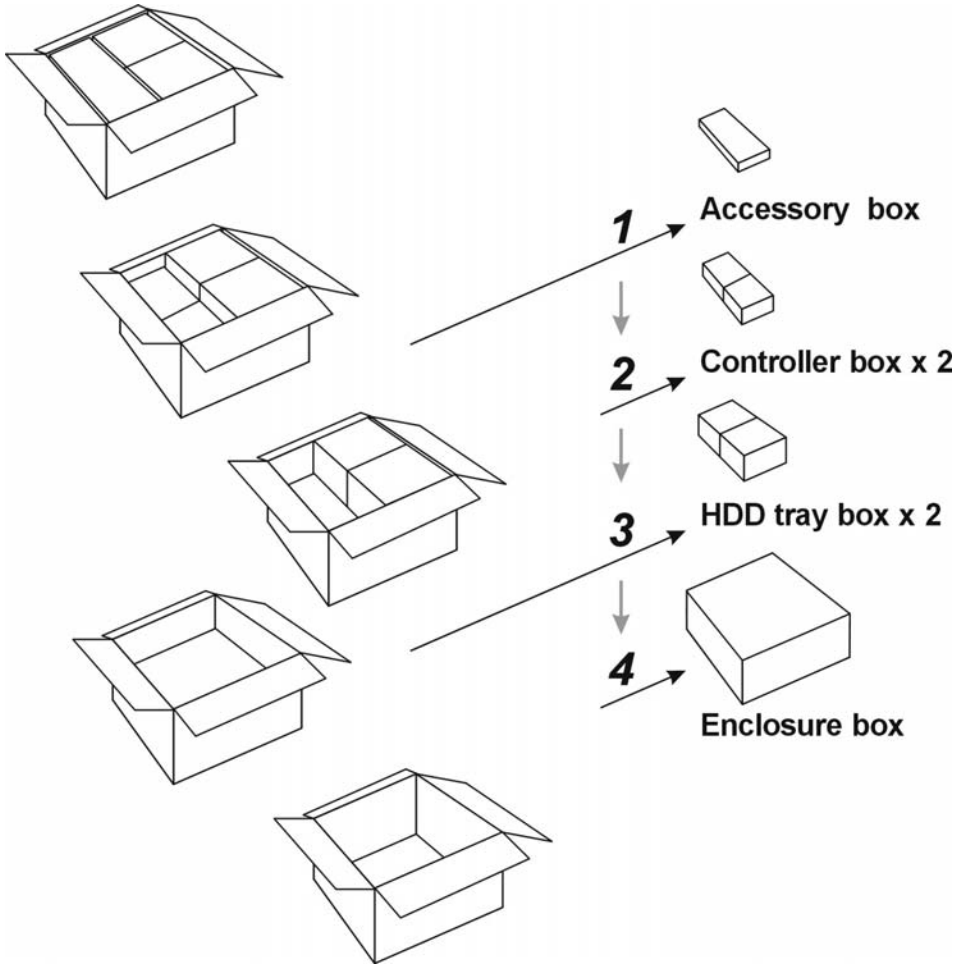


Figure C-1: ES U16U Packaging

C.3. Container Contents

C.3.1 Accessory Box

The accessories box should contain the items shown in ***Table C-1***.

ES U16U	Quantity
Power Cords	2
SCSI Host Cable	1
GUI CD Pack*	1
Screws for Mounting Drives	70
Null Modem	1
Screws for Mounting Enclosure & rack	12 (4 x M6, 4 x M5, 4 x #10-32
Quick Installation Guide	1

Table C-1: ES U16U Packaging

****The CD pack comes with the HW Manual, Operation Manual, GUI and GUI User's Manual***

C.3.2 HDD Tray Box

There are two drive tray boxes. These boxes each come with the following items:

- 8 Drive Trays

C.3.3 Controller Box

One box contains either:

- IFT-9270UCMU4-4 or
- IFT-9270UCMU4-6

Second controller box contains only a dummy plate.

C.3.4 Enclosure Box

The enclosure box comes with two EP foam blocks that are used to fix the chassis within the bottom of the box. The Enclosure Chassis contains the components shown below.

- System PCBs
- 2 PSU Modules
- 2 Cooling FAN modules
- 1 Host Port module
- 1 Power Switch Board
- 1 Power Switch Board with I^2C Connector
- 1 LCD Panel
- 2 Front Handles.
- A plastic bag enclosing the chassis.

Appendix D: Spare Parts and Accessories

D.1. Appendix Overview

This Appendix lists:-

1. Shared spare parts
2. Single-Controller Model Only Spare Parts
3. Single-Upgradable/Dual-Redundant Model Only Spare Parts
4. Shared accessories
5. Single-Controller Model Only Accessories

After reading this Appendix a user should:-

1. Be familiar with the spare parts that are available.
2. Be familiar with the accessory items that are available.

D.2. Spare Parts

D.2.1 Controller Modules

The controller modules, part number and controller module contents are all shown in ***Table D-1*** below. All the controller modules described below are installed in a metal canister.

Controller Module	Channels	Controller Board	IO Board	DIMM Module
IFT-9270UCMU4-4-0010	4 x SCSI-320	IFT-3260	IFT-9270UDU4S4	None
IFT-9270UCMU4-4M2-0010	4 x SCSI-320	IFT-3260	IFT-9270UDU4S4	256MB
IFT-9270UCMU4-4M5-0010	4 x SCSI-320	IFT-3260	IFT-9270UDU4S4	512MB
IFT-9270UCMU4-6-0010	6 x SCSI-320	IFT-3260	IFT-9270UDU4S6	None
IFT-9270UCMU4-6M2-0010	6 x SCSI-320	IFT-3260	IFT-9270UDU4S6	256MB
IFT-9270UCMU4-6M5-0010	6 x SCSI-320	IFT-3260	IFT-9270UDU4S6	512MB

Table D-1: Controller Modules

D.2.2 General Spare Parts

The spare parts listed in ***Table D-2*** can be used for the following subsystems:

Spare Part	Model Name	Description
HDD Tray	IFT-9270CDTray	EonStor 3U series hard drive tray.
PSU Module	IFT-9270CPSU	1U 460W power supply unit.
Cooling FAN Module	IFT-9270CFanMod	1U dual blower cooling FAN module with cage.
LCD Front Panel	IFT-9270CLCDPan	Front panel LCD module that includes the LCD module itself and a front face plate.
Left Handle	IFT-9270CHandLNL	Left handle with LCD panel
Right Handle	IFT-9270CHandR	Right handle for RAID subsystem.
Power Switch with I^2C Connector	IFT-9270CPSWBrd	Subsystem power switch with I^2C connector located above the left cooling FAN module.
Power Switch	IFT-9270CPSWBrd	Subsystem power switch located above the right cooling FAN module.

Table D-2: Shared Spare Parts

D.3. Accessories

The ES U16U accessories are listed in ***Table D-3***.

Spare Part	Model Name	Description
BBU Module	IFT-9270UBT	BBU Module can sustain 512Mb DIMM memory for 72 hours
SCSI Cable	IFT-9270UHstCab	SCSI cable for U16U to host, SCSI 68 pins to VHDCI
SCSI Cable	IFT-9270CDCCAB9	SCSI cable with 9 VHDCI connectors for Daisy Chain
SCSI Cable	IFT-9270CDCCAB5	SCSI cable with 5 VHDCI connectors for Daisy Chain
Null Modem	IFT-9011	Null modem cable
Slide Rail	IFT-9270Cslider32	Slide Rail 24"~32" for 3U 16 Bay Enclosure
Slide Rail	IFT-9270Cslider36	Slide Rail 26"~36" for 3U 16 Bay Enclosure

Table D-3: Shared Accessories

Appendix E: Pin-outs

E.1. Appendix Overview

This Appendix lists:-

1. The pin outs for the different external interfaces on the subsystem

After reading this Appendix a user should:-

1. Be able to determine the pin outs on the external interfaces of the subystem.

E.2. SCSI Port Pin-outs

SCSI port pin-out definitions are shown in ***Table E-1***.

* NC=No Connection, * GND=Ground,

* TPWR=Terminator Power

Pin	Name	Pin	Name
1	SD12+	35	SD12-
2	SD13+	36	SD13-
3	SD14+	37	SD14-
4	SD15+	38	SD15-
5	SDP1+	39	SDP1-
6	SD0+	40	SD0-
7	SD1+	41	SD1-
8	SD2+	42	SD2-
9	SD3+	43	SD3-
10	SD4+	44	SD4-
11	SD5+	45	SD5-
12	SD6+	46	SD6-
13	SD7+	47	SD7-
14	SDP0+	48	SDP0-
15	GND	49	GND
16	DIFSENS	50	GND
17	TPWR	51	TPWR
18	TPWR	52	TPWR
19	NC	53	NC
20	GND	54	GND
21	SATN+	55	SATN-
22	GND	56	GND
23	SBSY+	57	SBSY-
24	SACK+	58	SACK-
25	SRST+	59	SRST-
26	SMSG+	60	SMSG-
27	SSEL+	61	SSEL-
28	SC_D+	62	SC_D-
29	SREQ+	63	SREQ-
30	SI_O+	64	SI_O-
31	SD8+	65	SD8-
32	SD9+	66	SD9-
33	SD10+	67	SD10-
34	SD11+	68	SD11-

Table E-1: SCSI Port Pin Outs

E.3. Controller Interfaces

E.3.1 DB-9 Serial Port Pinouts

The DB-9 serial port pin-outs are shown in ***Figure E-1*** and their definitions are given in ***Table E-2***.

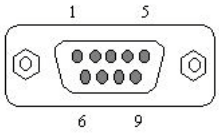


Figure E-1: DB-9 Serial Port

Pin	Pin Name	Pin Description
1	TX+	Transmitter positive
2	VCC	Power 5V
3	N/C	No connection
4	N/C (keylocked)	No connection
5	RX+	Receiver positive
6	TX-	Transmitter negative
7	GND	Ground
8	GND	Ground
9	RX-	Receiver negative

Table E-2: DB-9 Serial Port Pin-Outs

E.3.2 Ethernet Port Pin-outs

Ethernet port pin-outs are shown in ***Table E-3***.

Pin	Pin Name	Pin	Pin Name
1	LAN_TXP	**7**	LAN_RXP
2	LAN_TXN	**8**	LAN_RXN
3	CT	**9**	Pulled High for Pin 10
4	N1	**10**	LAN_LEDG (Link OK)
5	N1	**11**	Pulled High for Pin12
6	CT	**12**	LAN_LEDY (Data transfer)

Table E-3: Ethernet Port Pin-out definitions

E.4. Mains Power

IEC type receptacle.

E.5. I²C Port

RJ-11 Modular phone jack connector pin-outs are shown in ***Table E-4***.

Pin Number	Pin Name	Pin Number	Pin Name
Pin1	I2CCLK	Pin3	NC
Pin2	GND	Pin4	I2CDATA

Table E-4: I²C Port Pin-outs

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